MEDICAL LIBRARY JUN. 2 1919 UNIV. OF MICH. LIBRARY

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CXL. No. 2846.] LONDON, NOVEMBER 27, 1917. [69th Year. Price 6d.

O'NEILL'S

OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.

PALMERSTON HOUSE, LONDON, E.C.

Telegrams: "PURIFICATION, LONDON"
Telephone: 9144 London Wall.

EDWIN LEWIS & SONS, LTD.

Britannia & Patent Tube Works,

WOLVERHAMPTON,

Telephone No. 1147 (Private Branch Exchange).

LONDON & LIVERPOOL.

E. L. & S.

TUBES & FITTINGS.

R. & W. HAWTHORN LESLIE & CO., LTD.

In Stock.

TANK LOCOMOTIVES

Always In Progress.

Locomotive & Marine Engineers & Shipbuilders,

NEWCASTLE-ON-TYNE.

INTERMITTENT VERTICALS.

Adopted all over the World.

Vertical Gas Retort Syndicate LTD.,

17, VICTORIA ST., WESTMINSTER, S.W.

See Advertisement Sept. 11, p. 450.

Sole Agents for Australasia—
JAMES HURLL & CO., LTD., SYDNEY.

"TORBAY PAINT"

FOR ALL PURPOSES.

The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

GAS & CANNEL COAL CONTRACTORS.

WM. F. RUSSELL & SONS.

Telegrams for all Offices:
'MONKLAND."

GLASGOW: 90, Mitchell Street;
NEWCASTLE: Exchange Buildings;
HULL: Exchange Buildings, Lowgate;
LIVERPOOL: 5, Castle St.; &
SWANSEA: Atlantic Buildings.

JAMES McKELVIE & CO.

Coal Owners,

Gas and Steam Coal Contractors,

17, RUTLAND SQUARE, EDINBURGH.

59, MARK LANE, LONDON, E.C.

GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.

24, CHAPEL STREET, LIVERPOOL.

ESTABLISHED 1840.

W. PARKINSON & CO.

(Incorporated in Parkinson and W. & B. Cowan, Ltd.),

LONDON & BIRMINGHAM.

(See Advertisement p. 404).

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.

TUBES & FITTINGS for Gas, Steam, Water, &c.

"Extremely Accurate and Well Made"

aptly describes George Glover's Dry Gas Meter. Giving "correct" registration at all outputs and at varying pressures, it will be found satisfactory under the most trying conditions. Every meter leaving their works, irrespective of size—and they build up to 3000 lights—is regulated and tested for soundness at 12-in. pressure, and for registration not only at the ½-in. pressure prescribed by the "Sales of Gas Act," but at 3-in. pressure with full outlet capacity so as to prevent slow registration even when the Meter is overworked. Since 1861 the

George Glover Dry Meter

has gained the highest awards at the principal International Exhibitions and to-day represents the ideal gas recorder.

PARTICULARS AND PRICES ON APPLICATION.

GEORGE GLOVER & Co LTD

RANELAGH WORKS, CHELSEA, LONDON, S W 3.

R. MITCHELL, FOR PATENT SLOT METER PAD & OTHER LOCKS. 3 & 5, LEIGHTON ROAD, KENTISH TOWN, N.W. R. & J. DEMPSTER, LTD., 84 & 3296 Telephone Nos. Manchester.

RITCHIE C.I. PIPES FOR GAS & WATER. MIDDLESBROUGH.

J. & J. BRADDOCK

(Branch of Meters Limited),

GLOBE METER WORKS,

Telegrams: "Braddock, Oldham." Telephone 815. **OLDHAM,**

AND

45 & 47, WESTMINSTER BRIDGE ROAD,

Telegrams: "Metrigue, Lamb London." Telephone 2412 Hop. **LONDON, S.E. 1.**

MANUFACTURERS OF HIGH-CLASS

GAS STATION METERS.

BRADDOCK'S

STATION GOVERNORS

AND

RETORT-HOUSE GOVERNORS.

IMPROVED

WET & DRY GAS METERS

OF BEST QUALITY.

BRADDOCK'S PATENT

"SLOT" METERS.

FULL PARTICULARS ON APPLICATION.

RETORT SETTINGS

WILSON'S (CONT-INT.) VERTICALS

HISLOP'S HORIZONTALS

RENEWALS &

NEW BENCHES

GAS-WORKS ERECTED COMPLETE.

R. & G. HISLOP Underwood House, PAISLEY

THE GLENBOIG UNION FIRE-CLAY Co. Ltd.

GAS-RETORTS, HORIZONTAL, INCLINED, and VERTICAL, to New Standard Specification.

WORKS: Glenboig, Lanarkshire.

OFFICES: 43, WEST REGENT ST., GLASGOW.

Awards at British & International Exhibitions.
11 Bronze Medals.
18 Silver Medals.
19 Gold Medals.
9 Diplomas of Honour.
1 Grand Prize — Brussels, 1910.

In every case the highest award given for Fire Clay Goods.

The Glenboig Bricks, Blocks, and Retorts combine, in the highest degree, the qualities of not melting, and not splitting, when subjected to the highest heats and sudden changes of temperature, and are, in consequence, found to be economical, even in districts where the local bricks can be had at half the price.

GAS SERVICE REGULATORS.

PATENT No. 5093/08.

THOUSANDS IN USE.

For Gas Stoves.

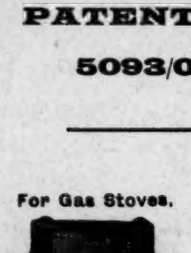


Fig. 618.
For reducing from 10 ins. to 2 ins. or 3 ins.
(Half Actual Size.)

Fig. 568.
For reducing the ordinary district pressure down to any outlet pressure from 10-10ths to 50-10ths.

The Governors are also suitable for regulating the supply of gas to gas engines.
High Pressure Type supplied for Higher Inlet Pressures up to 50 lbs.

No liquid or mercury seal floats.
Do not require accurate setting.
Constant outlet pressure maintained.
Inlet pressure can vary over wide range.
Regularity of light.

(High Pressure Type also for Higher Inlet Pressure.)

For Street Lamps.

Fig. 617.
For reducing from pressures up to 10 lbs. down to inches of Water.
Male or Female Ends.

When ordering, state Outlet Pressures and Figure Number.

DISTRICT GOVERNORS. ROTARY COMPRESSORS.

Regulators sent on Trial. *Price Lists and Discounts on Application.*

THE BRYAN DONKIN CO., Ltd.,

Head Office and Works, CHESTERFIELD.

London Office: MILLBANK HOUSE, Wood Street, WESTMINSTER, S.W.

Chesterfield Telephone No. 84.
London Telephone No. 5368 Victoria.

Chesterfield Telegrams, "Donkin, Chesterfield."
London Telegrams, "Donkin Vic. London."

GAS JOURNAL

LIGHT · HEAT · POWER · BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXL., No. 2846.] TUESDAY, NOVEMBER 27, 1917. [69TH YEAR.

EDITORIAL NOTES.

"Financial Hardships" and Private Bills.

THERE are in the gas industry "hardships" other than financial ones; and among them is the hardship occasioned by a want of frankness and confidence in matters of general policy between those to whom the industry look as leaders—especially in these times when there should be a pulling together with right goodwill. In the industry much is heard of co-operation, co-partnership, and unity; but to-day one wonders whether these terms, which fall so readily from the lips, have among some units a meaning which classifies them as merely hollow conceptions, or have some hard-and-fast limitation which spoils the fulness of the significance which it is customary (and rightly so) to attach to them. No one would, of course, question the right of the administration of any company to take such steps in any matter as was thought to be in the best interests of the concern. But when, in such extraordinary times as those through which we are passing, the industry is suffering from one end to the other from like causes which are producing like effects, and when, with the view to the alleviation of one or more of these causes, there is movement of common origin, and of common prosecution, seemingly participated in by all, as has been the case in connection with the question of "financial hardships," one would imagine that any intention on the part of administrative colleagues of action independent of the general movement would at all events be the subject of a communication to any body or persons who are leading in the common movement and cause. This, unfortunately, has proved not to be so.

There are times when surprises are good. Sir Douglas Haig and the Hon. Sir Julian Byng gave one such illustration on the Western Front the other day. But they were dealing with enemies, and not with personal friends, industrial colleagues, or business associates. A surprise was sprung upon the National Gas Council, by information accidentally reaching them—only, mark this! a few days before the last day upon which notice could be given, under the Standing Orders of Parliament, of the promotion of Bills in the coming session of Parliament—in reference to the intention of certain prominent companies to promote individual Bills to confer upon them relief from the hardship and damage which are, under the stress of current conditions, being inflicted in many cases by the operation of the sliding-scale. To take an independent course, the companies concerned have a perfect right; but secrecy is not, in the circumstances of a common movement and an apparent participation in it, what one would have expected from any quarter where co-operative effort is respected, and where in such matters something more than self-consideration is existent. What possible gain there could be in such secrecy, what object there could have been in keeping the intention concealed from the Executive Committee of the Council, it is impossible to conjecture.

At the time of writing, we do not know the lines—the adoption of the proposals of the National Gas Council for aught we yet know may be in contemplation—upon which relief will be sought by the companies who led in taking an independent course. But the eleventh-hour discovery as to their intentions demanded prompt action. Naturally, with certain companies seeking relief, others, upon learning this, were bound to follow suit; and the Executive Committee of the National Gas Council had also to consider their obligation to the industry and the resolutions which had been passed, as well as the obligation of the Council to the Board of Trade, who had given, and are still giving, sympathetic consideration to the question. What will therefore, we understand, be done in the case of these other companies will be to promote Bills, in which will be incorporated the proposals for relief as suggested by the National Gas Council, so that the Parliamentary Committee to whom the matter will be remitted will at all events have before them these several proposals simultaneously with whatever may be suggested in the Bills promoted by the companies who originated the independent action.

The prompt measures taken by the Executive Committee of the Council did not, as will be seen, stop there. The statement made by us last week, on what we believed was reliable authority, that the Board of Trade had decided that they could not promote a "Public Bill" to deal with the matter, was incorrect. We have since ascertained that the Board have not yet come to any decision in the matter. What the Board of Trade did say was that they considered that, if assistance was to be given, it should only be applied to undertakings where it could be shown that they were suffering material hardship, and not made general in application. The Board of Trade still have the matter in hand; and there is no reason to think they are disinclined to help those undertakings that are suffering unmerited hardship. This accounts for the circulation by the National Gas Council of certain special inquiries among a number of gas undertakings that are understood to be in a position requiring relief. It also accounts for the telegrams—probably some hundred—dispatched from the office of the Council, suggesting the promotion of individual Bills, upon it becoming known that certain companies were taking independent action. A number of companies, it is hoped, have taken advantage of this suggestion, and will embody in their Bills the National Gas Council proposals. As was said last week, too, there can be little doubt, in view of the special circumstances, that the Private Bill Authorities would look benevolently on late promotions. But a word of warning. It would be better for companies who have not a strong case to refrain from a promotion. "A bad case is a bad ally." But it is hoped that there will be a good representative number of deserving cases to go before the Parliamentary Committee. If there are not, it will be due wholly and solely to the rush occasioned by the circumstances explained in this article.

Gas Bill Notices—Non-Illuminating Gas for Ordinary Uses.

THE number of Gas Bills to be promoted in the coming session of Parliament is the largest of the war years; and there is in them a great deal of concentrated interest. They bring us into contact with the results of current conditions, and with developments to which the gas industry is looking forward; and there is novelty. In the circumstances mentioned in the above article, the Metropolitan Gas Companies, certain Suburban Companies, and a number of Provincial Companies will go direct to Parliament, and ask for relief in connection with the operation of the sliding-scale for the period of the war and for such further period as may be prescribed. As also explained in that article, this does not mean that the concern of the Board of Trade in the matter has ceased; but we have not the slightest doubt that what is done in Parliament and through the Board of Trade will eventually assume common form.

Next to this matter—perhaps it should really precede it in order of importance—comes a new proposal in the Bill of the South Suburban Gas Company. The first part of the Bill will submit a scheme for the absorption, under

an agreement, of the Dartford Gas Company. By this the South Suburban Company will be adding another large piece of territory to their already extensive area of supply, and a piece of territory which will give them a fine addition to the industrial day load. There is nothing like a good diversity of demand in strengthening the foundations of a gas business. But the proposal (it is a pioneer one) which strikes us most is the bold yet perfectly rational one by which power is sought to supply gas for, *per se*, non-illuminating purposes—purposes from incandescent gas lighting onwards through all the domestic and industrial requirements for heating and power. It has been obvious for some time past that the Chairman of the Company (Mr. Charles Hunt) has had his mind set in this direction ; and if Parliament does its duty to the gas industry, this Bill will mark another long stride in the progress of the industry's greater service in respect of the supply of heating gas to the community. There will, no doubt, be a big discussion over the matter. This must be anticipated. But the Company will be ready for it; and no more favourable time could have been chosen for making a fresh advance than the one when gas is being largely stripped of its illuminating properties in order to serve the country and its Allies in the war, when the questions of fuel economy and the extraction of the largest possible value from coal bulk so largely, and when so much additional knowledge has accrued regarding the use of blue water gas as a diluent, as well as in respect of the process of steaming in vertical retorts. There is all the material available to-day for carrying conviction (where commonsense prevails) as to the right lines for the development of gas supply; and between what the Company are proposing and what they are doing now at the instance of the Government itself, there is very little difference. It is clear that the various powers that are being sought are traceable to a desire on the part of the Company for an enlarged career of service. Certain electricity powers are to be sought, which should enable a Company providing fuel supplies to enter into considerable business relations, of a mutually advantageous order, with electricity supplies. They are also seeking authority to make provision with reference to the supply of gas for mechanically propelled vehicles, in regard to which it is also observed that the Aldershot Company are asking power to erect stand-pipes for filling gas containers. Reverting to the question of "non-illuminating gas," it is seen that the South Shields Gas Company are including an application in this connection.

Several Bills deal with financial matters; and it will be found—the Commercial Company's Bill may be cited as an example—that release is sought from curbing restrictions as to capital raising, which restrictions are, under the new financial situation created by the war, obsolete and obstructive to the raising of money for the progressive business of the gas industry. Prominent among the proposals is a continuation of the powers definitely initiated last session for the issue of redeemable stock. Authorization regarding new, and extensions of, works is observed—notably in the British Company's Bill in respect of the Norwich station and that of the Aldershot Company, including in both cases extensions of area. The Maidenhead Company have also plans in view as to new works. The last-named Company are also looking for an enlargement of their electrical powers. The Brentford Gas Company will ask for authority, among several other proposals, to supply power gas. The Rotherham Corporation are going to ask for authority to obtain gas from outside coal-carbonizing sources, including coke-ovens. The Sheffield Gas Company (in a Provisional Order) will seek to correct the absurd prohibition as to the use of coke-oven gas for lighting purposes, placed upon them by a House of Commons Committee last session.

The Wandsworth, Wimbledon, and Epsom Gas Company, with their large resources, are seeking to be invested with power to purchase for development purposes the residual products arising from the manufacture of gas by other gas undertakings, and so are the Pontypool and the South Shields Gas Companies. The war has put a new complexion on, or rather has emphasized, the question of the economic value, both to the industry and to the country, of business relations between undertakings differently circumstanced in their ability to work-up and deal-in the secondary products. Now we have also to look forward to industrial reconstruction after the war, and to the part that the gas industry can take in it through not only its gas supply, but its other productions. The development of benzol extraction, the debenzolizing of the wash-oil, and the extension of tar distillation plants in the industry have all been necessitated by the war; the requirements of new and enlarged industries due to the intention to make the country more self-reliant, and to increase its competitive power abroad, will be no less insistent upon such work as is now being done by the gas industry being continued and developed in the most economical way. The South Metropolitan Company are contemplating striking out into a new line of business in the interests of their undertaking. They are going to ask for power to enter into agreements or arrangements with firms or persons carrying on the business of chemical manufacturers or business of any other description connected with the requirements or work of the undertaking. This largely extends the range of possibilities. Annual meetings, it is remarked, are growing in favour.

The matters noted here are the ones that have the most striking significance in the notices of Gas Bills proposed to be promoted next session, and to which further reference is made in our "Parliamentary Intelligence."

Low-Temperature Carbonization and Gas-Works Requirements.

THE letter which appeared in our issue last week from Mr. F. D. Marshall shows the necessity for a clear definition and appreciation of what is low-temperature carbonization, so that when we speak of it we may know exactly what is meant. It may be laid down at once that what low-temperature advocates intend has no identity, either in plant, operations, or effects, with the dropping of temperatures in ordinary gas-works retort-settings, with some distinction (to which we will presently refer) in the case of continuous vertical retorts. We have, as a matter of fact, to be extremely grateful to the low-temperature processes for having proved out of their own retort mouths that they are not any use for the supply of town gas, coke, or for securing the largest yields of the subsidiary products which go to make up the business of the gas industry; and they themselves have returned the answer to those busybody outsiders, who, without being prepared to pursue the matter to the point of furnishing proof of feasibility and commercial advantage, so freely tender advice to the industry as to how it should mend its technical ways.

It may therefore be accepted at the outset that what are known as low-temperature processes occupy an altogether different field from the processes that are suitable for gas-works operations, though the continuous vertical retort has proved that, through the combination of high temperatures outside the retorts and varying temperatures inside the retorts owing to the cooling effect of the incoming coal, production in the shape of gas and coke is in volume and character what gas-works require, while the liquid products are of the paraffinoid character realized by low-temperature processes, and of greater volume than are obtained by high-temperature horizontal retort systems. Although we are not prepared to say that, owing to this, there is no useful field for low-temperature carbonization systems, and that they have no value, the fact that there is a gas-works process that, while giving large volumes of gas per ton of coal and a good coke, does, in its production of unsaturated hydrocarbons or paraffinoids, overlap into the low-temperature process field, leaving the other gas-works processes producing the saturated hydrocarbons (benzol, toluol, zylol, and so on)—must have some effect upon what from their very character must be the more expensively operated low-temperature systems. In these systems, it is necessary to work with small diameter retorts, which is totally opposed to gas-works economy, both in respect of capital expenditure on carbonizing plant and costs for labour. Using low temperatures and small diameter retorts means that more retort plant must be constructed than is needed for high-temperature working to deal with a given tonnage of coal; that more coal must be carbonized to produce a given output of gas; and thus the inevitable use of small capacity retorts must result in very considerable increase in labour costs. These conditions alone settle the use of the low-temperature processes from the economic standpoint of a gas manufacturer Moreover, to get the largest yields of those products that alone would justify the use of low-temperature plants, and to secure a coherent coke, suitable coal must be employed, which limits the range of such plants. One of the main reasons, in fact, for using small diameter retorts is to get a compact coke by keeping the charge, so to speak, under restraint. Thus we see that the low-temperature processes

applied to gas-works operations would result in the sacrifice of much economy and primary products, in order only to enhance the yield and character of certain secondary products, and that the objects aimed at by these low-temperature processes is not to be secured by gas-works retort plant, except partially in respect of the paraffinoid bodies through vertical retort working.

However, bearing in mind the structural distinctions necessary in the retorts for low-temperature and high temperature operations and for the desired combination of the results, there is drawn in Mr. Marshall's letter a useful temperature line, in relation to the character of the liquid products, at which discrimination can be made as to what is low-temperature and what is high-temperature carbonization. He says [*ante*, p. 376] that it has been established by Dr. Dunstan, Mr. C. W. Tozer, and himself that the average crucial temperature of carbonization in the *interior* of the retorts whereby the tar oils of the unsaturated or paraffin-olefine series pass to the benzenoid or saturated series, is approximately 1400° Fahr. Therefore, it may be stated generally that operations carried out at temperatures under 1400° Fahr. are low-temperature carbonizing, and over this figure they are high-temperature processes. If, therefore. benzenoid products are required, then there must be adherence to ordinary gas-works practices; if paraffins yielding petrol and fuel oil in large quantities, then interior temperatures must be under 1400° Fahr. (keeping in mind what has been proved in connection with continuous vertical retorts); and if it is desired to retain 7 to 12 p.ct. of volatile matter in the coke, which is volatile matter in the wrong place, then a descent to still lower temperatures must be made. From all that is stated in this article, it will be seen that comparisons cannot well be made between retort systems that are specially designed and constructed for low-temperature working and large gas-works retorts in which the temperatures are merely reduced. They are incompatibles; and so information is always necessary as to whether a low-temperature process is intended with definite objects in view, or low-temperature working of ordinary gas-retorts, which in itself is an assurance of disastrous results from the gas-works point of view.

Steaming in Vertical Retorts.

WE are glad to find our "Correspondence" columns bearing witness to the fact that this question—to interest in which Mr. John West and Mr. J. E. Blundell have given such impetus—has arrested the attention of so many gas technicians who have been experimenting in the same direction, and have discovered that steaming, like most other operations, requires the most favourable conditions to realize the maximum results. For example, Mr. Ernest J. Wellens in last week's issue and Mr. George H. Elliott this week, illustrate how the physical condition of coal has a considerable effect upon the efficiency of the steaming process; and this confirms what has been found in the long series of experiments carried out, with many varieties of coal, by Mr. West and his chemical collaborators. Naturally nuts and good screened coal admit of better penetration than a coal containing a large percentage of slack; and so the former is more favourable for steaming than the latter. A coal, too, of good volatile matter and low ash content is better than one with the reverse characteristics. Such variations naturally affect production per retort per ton, and therefore experience at different works. Thus it is that in all relation of experiences, full information should be given about the characteristics of the coal used, so that there may be some guidance as to the causes of the diversity of the experiences. The character of the vertical retort setting, too, will help steaming, or will put a limit on it. Mr. Blundell and other workers have shown the necessity for raising the temperatures in the Glover-West retorts in the lower sections of their carbonizing length, in order to reduce the CO_2 difficulty. In this there has been complete success, even with the steam at considerable pressures. It will be seen that Mr. Elliott, with Woodall-Duckham retorts, is unable to vary his heating arrangements in a manner that will enable him to steam at a decent pressure, and yet keep down the CO_2. But we have not the slightest doubt that simple modifications in structure would enable the temperature requirements to be complied with. Anyway, where steaming is not practicable through unfavourable temperature arrangements, there is always blue water gas to which recourse may be had; and in this connection we may venture to hope Mr. Elliott will be able—as he himself hopes to do—to try the effect of superheating blue water gas before passing it into the retorts. This is not a new idea. In his Presidential Address to the North of England Association in October, Mr. Nelson expressed the hope that a trial might be made with the continuous passing through the charges of vertical retorts of blue water gas preheated to retort temperature. As we remarked at the time, the preheating to retort temperature would mean an added process; but, nevertheless, if any compensating effects are obtainable—as we think there would be—then preheating would be justified. Regarding Mr. Elliott's remarks as to the valuation and sale of tar, perhaps he has overlooked what the National Gas Council are doing in the way of effecting a profit-sharing arrangement with a combination of tar distillers. If so, information will be found by him on p. 258 of the "JOURNAL" for Nov. 6.

Standardization of Gas Supply and Appliances.

Man of affairs in the commercial world associated with the gas industry, Mr. W. D. Helps delivered an address to the Yorkshire Junior Gas Association last Saturday, in which he made a broad sweep over considerations that will demand very earnest attention in, it is hoped, the not distant future, and which arise from the chaotic position in which the world now finds itself. A great readjustment will have to take place; and he pleads for the exercise of equity and intelligence on the part of all to bring the affairs of the world on to the new basis to which the events of the past three-and-a-half years have introduced us. He gave an insight as to his opinions on industrial matters as his experience has presented them to his view. There was plain speaking. There were little passing "digs" and sound advice all rolled into the composition. Only on one point can we here touch. Among the counsel given by Mr. Helps was that each gas engineer should supply the gas, in respect of its calorific value, composition, and pressure, that his district demands; which suggests that the uses of town gas are so diverse in different districts that it may be essential to supply gas of different character and pressures in them. Every area has its diversity of uses from domestic lighting through to industrial heating and power; and the diversity of use in a given district is so great that the quality of gas that is supplied in it ought to be equally suitable for supply in any other gas area. Later on there was a plea for a larger standardization of gas appliances, and for gas engineers and managers to refrain from the cost-promoting insistence upon little whims and fancies being incorporated. The eradication of these individual protuberances would admit of greater standardization, larger production and storing, quicker meeting of demand, and wider interchangeability, and so in every way in first cost and maintenance there would be a cheapening. This brings us back to the gas supply. The standardization of this, as far as coal and carbonizing conditions allow, would also be a factor in the permitting of the manufacture of universally suitable appliances. Perhaps Mr. Helps will further consider this point of gas standardization in relation to gas appliance standardization.

Concentrated Liquor and Destructive Water.

It was a compact address that the Chairman of the Midland Section of the Coke-Oven Managers' Association (Mr. J. W. Lee) delivered last Saturday. A busy man has not the time in these strenuous days to devote to preparing an address on studied lines, and packed with data collected from his working experience and investigation. Therefore the subjects that lie nearest to hand have to do duty. This was the case with Mr. Lee, who told the members what he had been doing in the way of installing and working a concentrated liquor plant, and of an experience he has had in connection with certain destructive action upon a chimney and regenerator, through water having entered the foundations on the bench side of the battery of ovens. Regarding the concentrated liquor plant, Mr. Lee gave an account of his working methods. He particularly emphasizes that the liquor feed should be free from tar; and he casts to the four winds theory which says that the liquor in the top tray should be kept as cool as possible. The quantity of water needed to effect a reduction of a few degrees is very great, while the loss of ammonia from the tray at a temperature of over 45° C. is negligible, and is returned to the scrubbers; so that no water is now used by him for cooling. Thus he economizes by saving the cost of the water and elimi-

nating the cooling. The experience with the entrance of water on the bench side of the oven battery illustrates the great importance of building all plant in which high temperatures are to be employed—such as furnaces, retorts, and ovens—upon a dry foundation, and even go to the expense of taking extraordinary precautions to keep out water. The physical effects of the water and steam upon the brickwork of the chimney and regenerator flues, combined with the chemical reactions taking place between water containing up to 200 grains of solids per gallon—chiefly alkaline sulphates—sulphuric acid, and the firebrick were of a destructive and costly character. But the lesson is one which should not be neglected.

War Work in Tight Harness.

The Public Service Commission of New York, judging from experience on this side, have a strange conception of how best to encourage the gas companies under their jurisdiction to serve the War Department by extracting toluol from their gas. It is admitted by them that the ingredients it is desired to remove from the gas can be better obtained under a calorific standard than under an illuminating power one; and they also recognize that a public emergency exists. They therefore proceed to assist in this public emergency by prescribing that the monthly average total heating power of the gas shall be not less than 650 B.Th.U., which, from our way of thinking on this side, corroborated by experience, is unnecessarily high, and does not give much scope for working up to the highest point of efficiency in respect of toluol extraction. Then again the price to be charged for the gas is not to be altered; but if a company elects to furnish gas of not less than 650 B.Th.U., the rate to be charged is not to exceed that now authorized, but there is to be a percentage reduction equal to the percentage by which the number of B.Th.U. monthly average is less than 650 B.Th.U. So that if in working for the best efficiency for the War Department, there is a falling away from the high figure of 650 B.Th.U., the companies are to be penalized. Furthermore, they are, on the application of any consumer who obtains illumination exclusively from flat-flame burners, to provide and instal, but not renew, free of any charge, one incandescent lamp complete with mantle, but not in more than two rooms. It is a good thing there are no more holes by which the Public Service Commission can further tighten the harness, and impose greater restraint upon the gas companies' liberty in rendering the greatest possible service to the War Department. Over here we consider, and the bulk of gas consumers agree, that, in this war, national interests come before the interests of the gas consumers.

Commercial Intelligence Committee.

Four years have now elapsed since the constitution of the Advisory Committee to the Board of Trade on Commercial Intelligence, who were first appointed for three years, and reappointed at the end of that period for a further term of a year. In a report covering this period, the Committee point out that the four years have seen a marked development in commercial intelligence work and organization. The former Commercial Intelligence Branch of the Board of Trade amalgamated nearly a year ago with the International Exhibitions Branch of the Board, and became the Department of Commercial Intelligence. It is now proposed to create a new Department, which will comprise functions both of the existing Department of Commercial Intelligence and of the Foreign Office, and which will be represented in Parliament by a Parliamentary Secretary responsible both to the President of the Board of Trade and to the Secretary of State for Foreign Affairs. Among the work accomplished during the life of the present Committee has been the collection of a Catalogue Library of over 8000 catalogues of enemy manufacturers, which is open for inspection by British firms; while another large collection of catalogues of neutral and allied firms forms a separate section of the library. Another useful branch is the Special Register—an organization through which information as to openings for trade that it is undesirable to make public in the "Board of Trade Journal," can be communicated confidentially to firms whose names, on payment annually of a guinea, are inscribed on the register. Part of the work now being done, of course, relates to the special conditions of the war; but the Committee see reason to suppose that the volume of work will be still greater when peace comes, in view of the period of exceptional industrial and commercial activity which may then be expected. A scheme has been prepared for a considerable extension of the system of Trade Commissioners which has now been in existence for ten years, so as not only to cover the Self-Governing Dominions more adequately than at present, but also to provide for the location of commercial intelligence officers in India and in certain of the Crown Colonies. Some months ago, a resolution was adopted at a meeting of the Imperial War Conference, welcoming the proposed increase in the service of Trade Commissioners, and its extension throughout the British Empire, and recommending that the Governments concerned should co-operate so as to make this service as useful as possible to the Empire as a whole, especially for the promotion of inter-Imperial trade. All these are signs of an activity which is essential, if the Empire is to be victorious in peace as well as in war.

Tile-Drying by Gas.

An oil-fuel installation for drying high-class fancy glazed tiles has been converted to gas by the San Diego (Cal.) Consolidated Gas Company, whose Industrial Gas Engineer (Mr. F. H. Mugg), has recounted in the "American Gas Engineering Journal" the advantages gained thereby. The plant is absolutely automatic. A hot-air furnace delivers 50,000 c.ft. of air per hour at a temperature of 140° Fahr. As the furnace is operated by a fan, making it possible to force air to any point desired, a main air-duct was built along the back of the drying-room, with laterals to each chamber, fitted with dampers for controlling the air. The drying-room is divided into four chambers, each independent of the others, and holding 3250 tiles. The floor-space occupied in drying by the old system of steam-pipes was 2555 sq. ft.; whereas the new method requires less than 500 sq. ft., or a saving of floor space of practically 80 p.ct. The saving in cost, based on working figures, is even greater—being just under 93 p.ct. There are various other benefits arising from the use of gas. The cost of repairing the boiler about twice a year [not included in these calculations] was considerable, and led to substantial delay in working. There was no way to dry small batches of tile, as can be done now with each chamber independent; and with the new system only four days' are required for drying, as against two weeks with the old. The saving in cost is reckoned on gas at $1 per 1000 c.ft.

Welcome to Our American Brothers.—Mr. W. M. Mason, the Secretary of the British Commercial Gas Association, advises us of a kindly thought which has been given effect to by the forwarding of the following cablegram to Mr. Louis Stotz, of the National Commercial Gas Association of America: "Please notify your members that if any coming to England on Service will call on Gas Manager where stationed or Secretary or Chairman in London, members here will gladly render any friendly service in their power." Mr. Mason and the B.C.G.A. are certainly amply justified in their confidence that gas managers up and down the country would gladly welcome the opportunity of extending friendly greetings and service to any of their colleagues from across the Atlantic.

Gas-Meters and Stray Electric Currents.—Mr. A. V. Brandt, of the Pacific Gas and Electric Company, Oakland (Ca.), has found that the ground current returning from street-cars to the generating station follows both the gas and the water mains, with the result that a slight difference of potential may exist, which may cause a change of current between the two supply systems at any locality where they happen to be metallically connected, as is the case with some forms of gas water-heaters. Under such conditions, if the gas-pipes are disconnected for any purpose—say, for the changing of the meter—a small electric arc is caused, which may lead to firing or explosion of the gas. His service men had frequently reported a plainly discernible spark at the moment of disconnecting or connecting, when the parts to be joined were brought nearly into contact. The remedy is a heavy copper wire, metallically connected to the pipe on each side of the break, or previous disconnection of the gas and water pipes.

A Cost Meter for Gas Appliance Sale-Rooms.—The American Meter Company have introduced a make of meter that not only indicates the cubic feet consumed per hour, but the actual cash cost at any desired rate for gas. It can be set by means of change wheels similar to those used in automatic meters. The dial shows in plain figures the rate per 1000 c.ft., and the cost per hour. It may be used independently, or in combination with a dry meter. The gas is passed through an accurate dry pressure governor, and delivered to the indicator chamber at an absolute uniform pressure. At the inlet thereto, it enters a valve, the stem of which is supported by a sensitive flexible diaphragm, which is raised or lowered as the gas passes under it, by the variations in the outlet pressure caused by opening or closing the outlet. It rises under increase of pressure, and reduces the supply of gas when the outlet is partly closed, but falls and passes more gas when the pressure is reduced by a greater draught on the outlet. The volume of gas passing through causes a vertical motion of the stem, that is communicated by appropriate gearing to a drum mounted on a vertical spindle, having a scale attached to the periphery that can be seen through a slot in the dial.

PERSONAL.

Prof. F. W. BURSTALL, of the University of Birmingham, has been appointed Gas Examiner to the Birmingham Corporation, in place of the late Mr. ALFRED CRESSWELL.

Mr. and Mrs. J. Addyman have been informed that their son Private L. ADDYMAN, who joined the Yorks Hussars nearly three years ago, has been wounded. He was on the staff of the Harrogate Gas Company at the time of enlistment, and had been in France over a year.

The name of Miss S. SCHOFIELD, daughter of the under-Manager of the New Wortley Gas-Works, Leeds (Mr. William Schofield), is included in the list of members of the nursing profession whose names have been brought to the notice of the Secretary of State for War for valuable services rendered.

Mr. GEORGE WILTON, who for fifteen years past has had the sole active control of the Chemical Engineering and Wilton Patent Furnace Company, has now disposed of his interests in the firm to a private limited-liability company incorporated as recently as Aug. 13 last. Prior to joining the firm, Mr. George Wilton was for twenty years engaged in the tar and ammonia products department of the Gas Light and Coke Company at Beckton, and was for fifteen years Assistant Manager of the department. He only resigned the position to join the above-named firm in 1902. In severing his connection with the Chemical Engineering Company, Mr. George Wilton has, we are informed, reserved to himself the right to practice only as an Advisory and Consulting Engineer in the same line of business, and has taken offices at No. 109, Victoria Street, Westminster, S.W. 1.

OBITUARY.

The death has occurred at Torquay, at the age of 73, of Mr. ALEXANDER M. CHANCE, who for many years was associated with the management of Messrs. Chance Bros. & Co., chemical manufacturers, of Oldbury.

ELECTRICITY SUPPLY MEMORANDA.

THE Council of the Institution of Gas Engineers may shake hands with themselves. They have in the Council of the Institution of Electrical Engineers companions who are constantly being kicked and buffeted for not doing those things that they ought to do, and for not aiming at a higher standard of serviceability; and except by themselves, it is considered that there is no health in them. The years come and the years go, but the periodical kicks and blows do not seem to have any salutary effect, and things keep very much in the traditional rut. The new President of the Electricals (Mr. C. H. Wordingham), in his recent Inaugural Address, dealt with the matter with freedom, taking the defensive, while admitting that full use has not been made of the opportunities possessed by the Institution, which are greater, through the possession of a home of its own, than in the case of the Institution of Gas Engineers. There was no occasion on the part of the President to regret that the members are not wholly satisfied with the Institution; the regret should be directed to the cause of the dissatisfaction. One of the ascribed causes as to why the Institution cannot reach the apex desired by its many critics is that it is constituted of heterogeneous interests, which, through their dissimilarity, cannot be synthetized. The Institution of Gas Engineers cannot adopt the same reason for not living a higher life. It is constituted entirely of professional gas engineers and managers; and therefore it can devote itself strictly to technical work, and leave to *ad hoc* bodies work in other directions—so making the utmost of its technical opportunities. Although the Institution of Electrical Engineers is an organization of manifold parts, Mr. Wordingham would have it largely confine itself to its legitimate purposes, which (judging from the several omissions that he recounts) are the very ones to which a purely technical organization may and should with unremitting zeal devote its attention, if it is to live up to a high standard of utility. The Institution should promote electrical science, applications of engineering, research work, and encourage the spread of scientific knowledge, and the improvement of engineering practice. It is not the right body to enter into questions of policy or commerce; but indirectly it serves both through technical progress, which is a point that is often overlooked. However, Mr. Wordingham suggests that the Institution should provide more technical interest for the members, and make greater use of its resources. This advice the Institution of Gas Engineers might, many men will say, take seriously to heart.

Shortcomings of the I.E.E.

Supplementing that work, it is noticed that Mr. Wordingham would like to see the Institution undertake popular lectures, directed to making the public realize better the advantage of electrical appliances. The gas industry would be delighted to see such work undertaken by the Electricals, if—the "if" may be emphasized—the lectures give, as Mr. Wordingham would have them give, "solid facts" to individuals of ordinary common sense. He rightly believes that these lectures would do far more to promote the objects sought by so-called publicity campaigns than any amount of exaggerated statements or of posters and illustrations imagined by their authors to be humorous or arresting. There are sound criticism and good advice wrapped up in these words. In the electrical industry, as the President needs no telling, but others may be reminded, there has been a deplorable omission of "solid fact" in connection with certain of the business sought by the electrical industry. Indeed, false pretences have often been put forward as "solid facts." For example, take the shrinkage-of-meat question, about which, for lack of something better, the electric-cooker man has frequently shouted himself hoarse. We have never heard an electrician lecturing to the public and referring to this matter, who has not spoken of only (say) a 10 p.ct. shrinkage of a joint in the electric-oven, while asserting that 20 even up to 40 p.ct. may be the disastrous consequence of cooking in a gas-oven. But they have never been known to put to the public this "solid fact," that, given equality of joint, oven temperature, and time, there is not the slightest reason why there should be more "shrinkage" in the one oven than in the other—in fact, through the water vapour given off by the combustion of gas, there should be, under equal conditions, less loss by gas than by the dry heat of electrical operation, seeing that the heavy humidity of the atmosphere that eventually obtains in the unventilated electric-oven must be the gradual product of the joint itself. Another "solid fact" is in connection with the boiling operations. More work is done on the hot-plate of an electric-cooker than in the oven; and the work of the heating elements of the hot-plate is accomplished under very inefficient conditions, to the uneconomy of which contribution is made by the fact that the unit of electricity has only a gross thermal value of 3420 B.Th.U. Another "solid fact" that could be presented in a popular lecture would be to tell the audience about the number of B.Th.U. expended in electrically securing those 3420 B.Th.U. Comparison might also be made between the useful heat put into a room by a crude coal fire consuming a given amount of coal, allowing it only 20 p.ct. efficiency, and that put into a room by an equal weight of coal utilized to generate electricity for use in an electric-heater. The comparison might be pursued to the question of cost for the maintenance of an equal temperature in the room by the two systems. From the comparisons, the "solid fact" might emerge that the electric-heater has no right, on the basis of efficiency in respect of the expenditure of B.Th.U., to call the coal fire bad names. If it is desired to give the modern gas-fire an advertisement, with its 70 to 75 p.ct. heating efficiency (about 50 p.ct. of which is in the radiant form), the comparisons could be continued still further. Then there is water heating. A good many "solid facts," amusing and otherwise, could be brought together in connection with water-heating by electricity—such as the time occupied in heating bulks of water for baths, the frequency that the members of households can have baths, and how promptly one after the other. There are to be found "solid facts" in abundance which count at present as conspicuous omissions from popular electrical lectures and literature. This is something that could be rectified under Mr. Wordingham's scheme, as no honest electrician desires to secure business under false pretences. We have all adopted the Comtist doctrine, and are altruistic, nowadays, and are out for nothing but national efficiency.

"Solid Facts."

While on the subject of popular lectures, it may be mentioned that the "eighth war programme" in connection with what are known as the Chadwick Lectures is in full swing. Among the lectures, three are being delivered at Leicester by Mr. H. T. Davidge, B.Sc., M.Inst.C.E., Professor of Electricity at the Ordnance College, Woolwich. The first was on "Electricity and the Improvement of Town Atmospheres." We have been favoured with a synopsis of the lecture, from which we see that Prof. Davidge began by stating that the war has brought home to all thinking people the urgent need in the future for national efficiency, which means obtaining the best possible results for a given expenditure of wealth and effort. We entirely agree. But then the lecturer went on to urge the pressing necessity for applying the latest developments of electrical science as an aid to making the best of our homes. There are a few considerations in the paragraph on "solid facts" which perhaps will assist Prof. Davidge to work out the money and time economy in relation to them, and to agree that not all electrical appliances that are offered for use in our homes are an aid to that "national efficiency which means obtaining the best results for a given expenditure of wealth or effort." The lecturer appears to have made a strong point of the conditions of town atmosphere, and its pollution by smoke from the combustion of coal. He does not, however, seem to have had anything to say as to the contribution of the boiler-house shafts of electricity generating stations. But he did agree that from every pound of coal consumed anywhere the utmost value of every kind should be obtained, which, in other words, means that coal must be utilized in manner to serve the larger interests of the country rather than those of any single industry. It does not necessarily follow that light, heat, and power can be most cheaply realized through the circuitous process of electricity generation. A metallic filament lamp will give 800 candle-hours by the use of

National Efficiency.

a unit of electricity; an ordinary incandescent gas-burner will give 800 candle-hours for 40 c.ft. of gas, which, at 2s. 6d. per 1000 c.ft., will cost only 1·2d. A single unit of electricity will generate 3420 B.Th.U.; so will 6 to 6½ c.ft. of gas; and a modern gas-fire will give a 75 p.ct. useful heat efficiency. A horse-power-hour requires about ¾ unit of electrical energy; by a modern gas-engine, a horse-power-hour can be realized by 16 c.ft. of gas. "National efficiency means obtaining the best possible results for a given expenditure of wealth or effort." Once more, "we agree."

Fencing-in the Competitor.

Our friend of "Cooking and Heating Notes" in the "Electrical Times" has fastened on to a remark made by Dr. Waldo, at an inquest at Southwark, that, although gas grills and rings are as dangerous as ordinary fires, "there are no regulations that they should be protected by guards." Gas grills and rings ought not to be placed where they need such protection, any more than should be incandescent electric elements, contact with which by inflammable material would be as dangerous as contact with a gas-flame. There are millions of gas appliances in use in this country, and it is rare that there are burning accidents from them. All people are not fools, though some electricians with superabundant self-esteem seem to think that they are, themselves excepted. Our friend believes that the public, having become accustomed to gas-cookers, ignore their dangers. He admits the difficulty of fitting guards round every gas ring and grill, but urges that guards should be fitted in front of gas-fires and oven burners. If this is so, then the same should be applied to all incandescent electric heating elements, though, of course, they are not so commonly used as gas-heated appliances. However, in the judgment of this would-be framer of public opinion, "the obvious remedy is to carry out cooking by the agency of electricity, which has no flame, and introduces the least risk of fire of any heating medium, while being the cleanest, most convenient, simplest, and the most satisfactory system yet introduced." Is this all true? Would the writer be prepared to demonstrate the truth by a working comparison? Has he not read how the President of the Institution of Electrical Engineers has pleaded for "solid facts," and the avoidance of "exaggerated statements," and also, what Prof. Davidge has said regarding "national efficiency?"

Deaf and Dumb Meter Readers.

From time to time, there have been published some ghastly specimens of errors due to electric meter readers, which have involved heavy sums through long continuance of the mistake. Meter readers have our sympathy. Any hole-in-the-corner position is considered good enough for the meter. Dark cobwebby cellars, sometimes with loathsome occupants, and packed with obstructions to facile access to the meter, are often considered good enough for the assessor of the indebtedness of the customer to the purveyor of electricity; and we must acknowledge that the same criticism would hold good for many gas-meters. The idea is that the meter should be as close as possible to the entrance of the service to the premises. No wonder mistakes are made. G. W. Stubbings has been writing in the "Electrical Review" on the subject of how to prevent mistakes in meter reading; and with much of his comment as to the conditions under which meter readers are expected to accurately perform their duties, we are in sympathy. He finds that in electric meter reading, in these war times, mistakes are more frequent, owing to the fact that men and women with little or no previous experience have been put upon the work. We need not run over the causes of error; they are due as much to the conditions under which the work has to be carried on as to the inefficiency or carelessness of the readers. These conditions are well known—such as inaccessibility, bad light, and diminutive dial figures. But comparison with the corresponding period of the preceding year will often act as a salutary check. The part of Mr. Stubbings's article that struck us most is where he reveals the anxiety of electricity purveyors that meter readers should not get into conversation with electricity users, lest he or she should betray something or express an opinion that is not conducive to the best interests of electricity undertakings. This is what he says:

> Meter readers should be instructed to endeavour not to talk to consumers, and not to express any opinion regarding any complaint they may have to make. Such a discussion is not only a waste of time, but sometimes gives rise to disputes, owing to the consumer alleging that the meter reader said something that he either actually did not say, or did not intend to say. Meter readers may be betrayed into expressing some opinion which will subsequently be quoted by the consumer as having been offered by an authorized representative of the supply authority. Meter readers should, therefore, tell consumers to make their complaints by letter. The same applies to requests by the consumer for work to be done, or minor alterations to be carried out.

But there may be inconsistency where it serves the purpose of the electricity undertaking:

> In cases of low consumption, the meter reader might inquire of the consumer as to the reason of the same, and make a note of such reason. This will be useful, as at some future time an estimated consumption may have to be made, when the consumer may endeavour to get the low consumption, which really was due to abnormal conditions, taken as a criterion for estimation. The instruction to avoid, as far as possible, conversation with consumers must not, of course, be taken to absolve meter readers from the natural obligation to be courteous, and to endeavour to cause the consumer as little inconvenience as possible.

Why this attitude? A meter reader should be trained sufficiently to enable him or her, as a representative of the supply undertaking, to help to maintain good relations between buyer and seller. The man who uses the scales behind the counter is the man who can talk to customers as to the qualities and values of the commodities on sale. Our experience is that many gas and electricity consumers will not trouble to write or call at the offices of the suppliers, but will often speak to the only available representative, who, as a rule, is the meter reader, who can act as a channel of communication between the employers and consumers. We do not believe in deaf and dumb meter readers. They will listen and they will speak, their instructions notwithstanding from the head office. Therefore, better to tutor them properly, so that their efficiency as agents extends beyond mere meter reading, and their knowledge will avoid the results which Mr. Stubbings and so many other electrical men fear.

Electro-Culture.

The electrical press has had a little tilt at the Imperial College for having been called in to take part in the study of electro-culture problems—a matter to which reference was made last week in the "Memoranda." The "tilt" seemed to us to be more in respect of the proneness of technical establishments to make a long job of an investigation of the kind, than at their capacity for undertaking the work. A rebuke has been administered to the "Electrical Times" by Mr. V. H. Blackman, of the Imperial College. He points out that the College possesses laboratories specially equipped for the study of plant physiology, and that the assistance is available there of experts in chemistry, physics, and electrical engineering. Therefore, the College is particularly fitted to undertake the investigation. He also says the variability of the experimental results already obtained indicates clearly the danger of premature conclusions. In the article which has drawn Mr. Blackman, the assumption appears to have been made that the case for electro-culture is fully made out, whereas most agricultural and horticultural experts are still very sceptical as to its value. "This is due to the fact that the majority of the results quoted in its favour carry little conviction." The writer of the article is also told that he does not seem to realize fully the difficulty of the problems involved in electro-culture. Even the relation in an installation of current and voltage is not the simple matter that the electrical engineer might expect. Not only physical factors but biological factors play their part; the relation varying not only with different crops, but even with different stages of the same crop. Electro-culture is not, therefore, a proved proposition as the electrical papers imagine.

Benzol Storing and Loss.

Writing to the "Engineer" on the subject of benzol, Mr. T. D. Parr makes reference to the loss during storage. He points out that benzol, petrol, and other volatile hydrocarbons, are stored in tanks, frequently of very large individual capacity, to which the atmosphere has free access through the ventilators; and storage of a volatile liquid under such conditions can be nothing but wasteful. In the case of a tank partly filled with benzol, the remaining portion will be filled with a mixture of vapour and air. When the temperature rises, due to the action of the sun, the bulk is increased, and a portion of the mixture is expelled to the outer atmosphere. Then when the temperature falls again, the bulk of the mixture contracts, and fresh air is drawn into the tank. This air quickly takes up its quota of benzol, and is ready to be expelled on the next rise of temperature. The process of the admission of fresh air and the ejection of mixture is continuous; and any small changes of atmospheric temperature or pressure bring about a corresponding loss of benzol. But this is not the only trouble; for naturally the lightest fractions volatilize most freely, and therefore the loss is not only a matter of quantity, but also of quality. Mr. Parr declares that the waste of volatile liquids in the United Kingdom entailed by this method of storing amounts to many millions of gallons per annum; and the one thing essential to its prevention is the exclusion of fresh air. In explaining his suggestion for meeting the case, he remarks that (say) a barge when returning for a fresh cargo, will contain a full charge of the mixture already referred to; and if, when being filled with liquid from the bottom of the storage tank, the mixture is returned through a separate pipe to the top of the tank, the combined volumes of liquid and mixture in each will be a constant. The new mixture may on admission to the tank take up a small extra proportion of vapour, thus increasing its bulk; and the escape of this excess may be provided for by a small gasholder working on a slight vacuum. The holder, by its flexibility, will provide for expansion and contraction of the mixture, and so exclude fresh air.

Mr. Andrew S. Biggart, M.Inst.C.E., who was closely associated with the late Sir William Arrol and Mr. William Foulis in the installation of gas-works stoking machinery, left estate of the gross value of £47,778. Estate of a gross value of £10,358 has been left by Mr. George Ennis, who was at one time an Auditor of the old Phœnix Gas Company.

THE RARER KEY-MINERALS.

IN a lecture before the London School of Economics on Nov. 16, Mr. Sydney J. Johnstone, B.Sc. (L.), of the Scientific and Technical Research Department of the Imperial Institute, gave an account of the sources of a number of rare metals found within the British Empire. These included tungsten, molybdenum, thorium and cerium, tantalum, vanadium, zirconium, and others.

Special interest attaches to his account of the deposits of monazite sand in various parts of the world. It is well known that at one time the chief source of this material was Brazil; while other deposits occur in North and South Carolina. In both these cases the amount of thoria available does not exceed 4 to 5 p.ct. The monazite sand discovered at Travancore, in India, is richer, containing twice this percentage. This sand, like the Brazilian deposits, was formerly under German control, but is now available for British users. During the past ten years much work has been carried on, under the auspices of the Imperial Institute, on sources of thorium in Ceylon. Ceylon monazite, when pure, yields about 10 p.ct. of thoria; but occasionally minerals containing as much as 30 p.ct. are found. A new mineral discovered in Ceylon, thorianite, has been found by the Imperial Institute to be extremely rich in thoria, containing as much as 60 to 80 p.ct. In 1905, about 10 tons of this mineral was produced and sold at prices up to £1700 per ton. So far, however, no very large deposits have been located. The value of the Travancore and Ceylon deposits may be judged from the fact that in 1915 India produced 73 p.ct. of the world's output of monazite and 90 p.ct. of the total thorium production. Late in 1914, the price of thoria rose from about 19s. a kilo to nearly 90s.; the supplies being quite inadequate to the demand. The effort now being made to manufacture thorium nitrate in the United Kingdom should help to ease the situation; and it is to be hoped that in the future this country will produce enough to meet the world's needs. Concentrating machinery for the treatment of Ceylon monazite has been exported from the United Kingdom. Monazite is known in many parts of the British Empire; but the only deposits at present being worked are those referred to above.

Thoria finds a ready use for incandescent mantles, the manufacture of which Mr. Johnstone briefly described. The standard incandescent mantle contains about 0·5 gram of rare earths, of which thoria finds by far the greater proportion—only about 1 to 2 p.ct. of ceria being employed. As cerium salts constitute about 60 p.ct. of the monazite sand, enormous quantities tend to collect as a bye-product. Chemists have therefore been diligently seeking for new uses for the material. Cerium salts are used for colouring glass yellow, as a mordant in leather dyeing, and for colouring porcelain. They have also been applied as a contituent in the electrodes for flame arc lamps. An interesting application of cerium is the ferrocerium alloy used in pyrophoric automatic igniters. The amount of cerium contained is small. Originally the price of this compound was over £5 per pound; but by 1913 the value had diminished to 8s. 6d. per pound. The material has been used as a means of defining the flight of shells. A small piece of alloy is attached to the shell, and a short interval after the shell has left the gun friction with the air causes the alloy to ignite.

Another group of substances dealt with by the lecturer—tungsten, molybdenum, vanadium, &c.—are used largely as constituents in special steels for armament work. Some alloys with tungsten have the valuable property of retaining their hardness at a considerable temperature. In the production and extraction of these materials the British Empire holds a strong position. The chief source of tungsten in Burma. In various parts of Australia, however, other valuable deposits occur; and the Empire now provides 35 p.ct. of the world production. Moreover, both tungsten and molybdenum are now prepared from the ores at smelting works erected in the United Kingdom. Apart from its uses for special steels, for high-speed tools, and for electric lamp filaments, tungsten has applications in dyeing, and is employed for fire-proofing textile fabrics. Molybdenum, like tungsten, can now be produced in a condition capable of being drawn into very fine wires, in which condition it is practically unaffected by the atmosphere. It has been used, as gold-covered wire, to a considerable extent in dentistry.

Zirconia, which is obtainable from baddeleyite, a mineral occurring in Brazil, has been used for all sorts of refractory vessels required to stand sudden changes in temperature. Its high melting point (2700° C.), and its resistance to chemical action, render it suitable for furnace linings. Baddleyite is not known to exist in the British Empire; but it has been suggested that zircon, which is a waste product from the dressing of monazite, might be used instead.

Platinum is one of the few important key minerals which has not yet been located in any quantity in the British Empire. The chief sources of this material are at present Russia and Columbia; but there is hope that Canada may furnish this metal in the future. Osmiridium is chiefly valuable for its high content of iridium, employed for hardening platinum and for lining certain furnaces. It occurs in various parts of Australasia, South Africa, and British Columbia,

It will thus be seen that, with the single exception of platinum, practically all the important key-metals occur within the Empire. In many cases the development of these materials has made considerable progress since the outbreak of war; and there is reason to expect that they will become an important industrial product in the future.

SIXTY YEARS AGO.

From the "Journal" for November, 1857.

Disorganization of the Money Market.—The fearful state of disorganization of the money market, of course, puts a stop to all speculation. It will, we fear, be some months before any change for the better can occur; for the capitalists are sorely frightened. Fortunately, there is no real ground for alarm in our case; for, of late years, Englishmen have certainly not over-traded, and the principal, if not the only, sufferers from the present crisis will be among those connected with the American trade. We cannot, therefore, believe that it will be of any great duration; and we are convinced that, as in 1849 money was at 3 p.ct. after being at 8 p.ct. in the latter part of 1847, so we shall shortly witness a similar revulsion in the state of the money market. Before this occurs, however, it is to be feared much misery and ruin will be inflicted; and another striking illustration will be given of the intimate connection which exists between the interests of nations.

Districting in the Metropolis.—The important measure of administrative reform recently adopted by the Western Metropolitan Gas Companies, for assigning to each Company the district best suited to its means of supply, with the view of diminishing the nuisance arising from the constant tearing-up of the streets, has, with few exceptions, been approved of by the local authorities, upon the assurance that gas shall continue to be supplied on the same terms as heretofore. There may be a few blind partizans of free trade in gas who are willing to submit to the practical inconveniences resulting from the unnecessary stoppage of our thoroughfares for the sake of the imaginary advantages which they profess to discover in having two or more sources of supply. But such find few to sympathize with them; and, so long as the Companies adhere to their pledges of giving a good supply of gas equal in quality and purity to that which they have provided of late years, and on the same terms, they have nothing to fear from these ebullitions of temper. There is no perversion of the human intellect more lamentable or more annoying than a discontented, fretful disposition, that is ever imagining a grievance and always brooding over supposed injury. The sufferings such beings endure amount to moral martyrdom; the injustice they experience demands a hecatomb of vengeance; and when, at length, mortal flesh and blood can bear no more, and they appeal to the public for sympathy and redress, the publication of their case discloses that their sufferings are self-imposed, that vengeance should rightfully fall on their own heads, and that these most ill-used of human beings have been much better treated than they deserved.

Substitute Metals for Gas-Meters.

The effect of the commandeering of metals in Germany on the construction of gas-meters is described in the "Journal für Gasbeleuchtung"—translated into a recent number of the "Ironmonger." Owing to the scarcity of petroleum, there was a run on gas-meters, with which the mauufacturers were unable to cope for want of the usual raw materials and skilled labour. Substitute metals had to be sought; but this was not easy, as there were no experiments to go upon, and no time to make them. The polished brass unions which account for the largest proportion of brass used in a gas-meter were replaced by cast-zinc unions. But this did not prove satisfactory; and, in spite of the danger of rust, malleable cast iron was then substituted. The nozzles and draining plugs of the wet meters were also made of cast zinc or iron. For the dial mechanism, iron could not be used as a substitute for brass, as it rusts and is difficult to work; but for this work, as well as for the worms and worm-wheels of the dry meters, brassed zinc gave good results. It was more difficult to find a substitute for the red copper and bronze parts of the wet meters, as these parts are continually in contact with water as well as with gas. The drum axle and capstan were made of open-hearth ingot iron and brassed; while for the frames a bronze containing a large proportion of zinc was used, and brassed to make it possible to solder these parts in the usual way without using hydrochloric acid. The substitution of brass and copper was thus satisfactorily solved; but it was found very difficult to discover a good quality of solder. Here the lack of experienced men was acutely felt, as it requires great skill to make gas-tight soldered seams. The small leakages in the interior of the gas-meters caused by flaws in soldering made it necessary to submit the meters to very severe tests, and continually to control the quality of the solder. For the case and drums, lead-coated sheet iron was used, in place of tinplate or galvanized sheeting; but no serviceable substitute for the leather diaphragm has been found.

At a meeting of the Chemical Society in London last Thurs day week, Messrs. Levinstein, Ltd., of Manchester, had on view an exhibit illustrating the application of coal-tar dyes and pharmaceutical products to modern warfare. There were samples of artificial indigo, of aniline dyes, and of the antiseptic "Flavine."

COKE-OVEN MANAGERS' ASSOCIATION.

MIDLAND SECTION.

Inaugural Address by Mr. J. W. Lee.

The First Meeting of the Session of the Midland Section of the Coke-Oven Managers' Association was held on Saturday, at the Grand Hotel, Sheffield, when the CHAIRMAN (Mr. J. W. Lee, of Grassmoor) delivered his Inaugural Address.

CHAIRMAN'S ADDRESS.

It is the duty of the Chairman to serve; and one of the duties bringing with it the most anxiety is the preparation and delivery of an address. In normal times this would be so; but in these strenuous days, it is a most difficult task. Time for its careful preparation is absent; and the noting and collection of the necessary facts and figures is next to impossible. I intend very briefly, therefore, to select from my experiences of the last few months some that I hope will be of interest and profit.

A CONCENTRATED LIQUOR PLANT.

Like many of you, I have had during the year to erect and bring into use a concentrated liquor plant. I need not weary you with a long description. It is, as of necessity must be the case, I suppose, the addition of the minimum new plant to the existing stills. The new plant (supplied by Messrs. Newton, Chambers, & Co., Ltd.) consisted of a five-tray decomposer of the Brunner-Mond type, two condensers, a liming vessel, an absorber, and the necessary tanks, &c.

The ammoniacal liquor is fed into the top tray of the decomposer by gravity feed from an overhead tank kept at a constant level. The liquor feed should be free from tar. Experience would prompt me to underline this last sentence in red ink. If the liquor is contaminated with tar, the resultant trouble from naphthalene is very great. No heat is applied to the liquor in the top tray; but provision is made for cooling by water. As the water is passed through lead coils, pit-water could not be used; so town water is connected. Theory says the liquor in this tray should be kept as cool as possible. It is usually stated that the temperature should not exceed 20° C. The quantity of water required to effect a reduction of a few degrees is very great; and as experience has shown that the loss of ammonia from this tray at a temperature of over 45° C. is negligible, and is returned to the scrubbers, no water is now used—a saving of over £100 per year being thus effected.

The temperatures to which the liquor is heated on each tray by means of indirect steam are shown in the tests given. In the bottom tray provision is made for using direct steam. By employing a little direct steam, it is possible to get a higher temperature on the bottom tray, and reduce the sulphuretted hydrogen content of the liquor leaving the decomposer. The liquor from the decomposer enters the stills; and the vapours enter the first condenser. The temperature at the outlet of this condenser is maintained at 92½° C. The condensates—"run-back"—return to the stills, entering the second section from the top of the "free" still. The ammonia gas enters the liming vessel, bubbling through a seal of milk of lime. After liming, it passes to the second condenser through the absorber to the storage tank. The lime, after use in the liming vessel, bringing with it a quantity of ammonia, enters the top section of the "fixed" still.

The following tests will illustrate the working of the plant:

LIQUOR TO DECOMPOSER.

Test No. 1.

Steam pressure on main, 140 lbs.
Steam ,, ,, decomposer, 9¾ lbs.
Direct steam on tray No. 5.

—	Temperature.	Ammonia. Free.	Fixed.	Total.	CO_2	H_2S
Feed	40° C.	·976	·238	1·214	·973	·126
No. 1 tray	39° C.	·976	·236	1·212	·946	·120
No. 2 ,,	47° C	1·059	·204	1·263	·940	·116
No. 3 ,,	80° C.	1·051	·197	1·248	·529	·102
No. 4 ,,	94½° C.	·964	·190	1·154	·506	·095
No. 5 ,,	100° C.	·953	·186	1·139	·132	·068

Gas from decomposer to foul main free from NH_3.
"Lime liquor" from lime vessel to stills contained 14·50 p.ct. NH_3.
"Run back" from first condenser contained:

3·40 p.ct. NH_3
·48 p.ct. H_2S
·46 p.ct. CO_2

The waste liquors from stills contained:

No. 1 still ·0170 p.ct. NH_3
No. 2 ,, ·0019 ,,
No. 3 ,, ·0281 ,,

Concentrated liquor contained:

25·16 p.ct. NH_3
·58 p.ct. H_2S

Test No. 2.

Steam pressure on main, 130 lbs.
Steam ,, ,, decomposer, 8½ lbs.
Direct steam on tray No. 5.

—	Temperature.	Ammonia. Free.	Fixed.	Total.	CO_2	H_2S
Feed	..	·976	·146	1·122	1·320	·143
No. 1 tray	43° C.	·978	·146	1·124	1·300	·139
No. 2 ,,	46° C.	1·013	·133	1·146	·647	·129
No. 3 ,,	68° C.	1·286	·127	1·413	·500	·119
No. 4 ,,	93° C.	1·309	·196	1·505	·110	·119
No. 5 ,,	99½° C.	·830	·167	1·003	·107	·045

Gas from decomposer to foul main free from NH_3
The waste liquor from the stills contained:

No. 1 still ·0022 p.ct. NH_3
No. 2 ,, ·0087 ,,
No. 3 ,, ·0298 ,,

Concentrated liquor contained:

24·47 p.ct. NH_3
·44 ,, H_2S

Test No. 3.

Steam pressure on main, 140 lbs.
Steam ,, decomposer, 10½ lbs.
No direct steam on No. 5 tray.

—	Temperature.	Ammonia. Free.	Fixed.	Total.	CO_2.	H_2S.
Feed	40½° C.	1·058	·258	1·316	·996	·158
No. 1 tray	39° C.	1·058	·258	1·316	·946	·152
No. 2 ,,	43° C.	1·027	·248	1 275	·646	·102
No. 3 ,,	64° C.	1·115	·250	1 365	·529	·100
No. 4 ,,	90½° C.	1·197	·268	1·365	·506	·096
No. 5 ,,	98° C.	1·296	·286	1·582	·168	·090

Gas from decomposer to foul main free from NH_3.
The waste liquors from the stills contained:

No. 1 still ·0107 p.ct. NH_3
No. 2 ,, ·0029 ,,
No. 3 ,, ·0204 ,,

Concentrated liquor contained:

25·34 p.ct. NH_3
·40 ,, H_2S

The figures are self-explanatory, and need no comment, except to point out that, without liming, on this type of plant, it is not possible to produce a concentrated liquor with a sulphuretted hydrogen content of 0·5 p.ct.

REPAIRS TO A CHIMNEY AND REGENERATOR.

I turn to an experience of a totally different character. In the early part of the year, urgent repair became necessary on the chimney of our regenerator ovens. On examination, it was found to be badly cracked from the top downwards. Nearly 20 ft. was taken off—unfortunately, not without loss of life—and rebuilt without interruption to the working of the ovens. Before and after this work had been done, considerable difficulty was experienced on this battery in obtaining the required draught. On inspection of the air flue and regenerator on the bench side, these were found to be badly blocked. Water, in large quantity, had entered the foundations on this side of the battery; and, as a consequence, the brickwork had perished, and, crumbling, blocked-up the bottom portion of the regenerator.

I have for years impressed upon my students the great importance of building every type of furnace, retort, or oven upon a dry foundation, and taking extraordinary precautions to keep water out. No price is too great to pay to keep water and heated fire-brick apart. The main reason advanced for this has been the loss of fuel in drying a wet foundation. This is, of course, an important reason; but a greater one is the damage to the brickwork by water and steam. Add to the physical effect the chemical reactions taking place between water containing up to 200 grains of solids per gallon—chiefly alkaline sulphates—sulphuric acid, and the fire-brick, and you obtain an explanation of the damage to our chimney, and the blockage of the flues.

The effect upon the fire-bricks in the regenerator is well illustrated by samples shown. The first is taken from the top portion of the regenerator, and has been hardly affected. It shows on analysis:

	P.Ct.
Silica	70·80
Oxide of aluminium	22·62
Oxide of iron	5·26
Oxide of calcium	·52
Oxide of magnesium	·50
Alkalies—by difference	·30
	100·00

Others show the effect of continued action; and, in the final result, the sample consists of:

	P.ct.
Sodium silicate	94·72
Silica	5·28
	100·00

In view of the fact that upon this battery the colliery depended for its supply of gas for power purposes—approaching 750,000 c.ft. per day—and that failure of supply meant stoppage and serious loss, we were confronted with the problem of cleaning-out the regenerator on the bench side, re-filling, and keeping the battery in operation. Time does not permit me to enter into the details of how it has been done. Sufficient to say it was done on the turns; the length of the times of working in the flue being determined by the heats. These had to be carefully nursed, of course.

The regenerator is about 160 ft. long, and contains over 180,000 chequer bricks, resting upon nearly 1000 bottom blocks. The blocks are supported on over 100 walls, containing nearly 9000 bricks. Supporting walls, bottom blocks, and nearly one-third of the chequer bricks were affected by the action of the water. The whole of the chequer bricks had to be removed; the perished brickwork dug out; walls and bottom blocks renewed; and the regenerator refilled with chequer bricks. The work was commenced in April, and, owing to difficulties in obtaining bricks, is not yet finished. On various occasions we have been held-up for bricks, and have only worked in the flue in the day time, and also avoided week-end work. Add to the cost of the work the reduction in output over many months, due to the difficulty of maintaining heats in consequence of blockage, and you obtain a very large total; and I think you will agree with me how costly water in the foundations may become.

From photographs shown, you will be able to understand, in some measure, the nature of the work which had to be undertaken, and appreciate the fact that it was done without any interruption of the supply of gas to the colliery power plant, or loss in output.

COAL-WASHING.

One further note, and I have done. It has been necessary during the year to devote much attention to the question of coal washing. Very little data on the subject are available; and some of the results obtained in a "Humboldt" washer will be of interest to you. The washer is many years old, but will (except in cost of running) give results, as I have reason to know, equal to some more modern washers.

A brief description of the washer is necessary, in order that you may follow the figures. The slacks from the wagon are emptied into a pit, and taken by means of a band conveyor and a bucket elevator to a large screen, where they are sized before washing into ¾ in., ½ in. and ¼ in. The ¾ in. and ½ in. pass straight to the washers. The ¼ in. slack is elevated to a dust-screen, and the fine dust removed before the ¼ in. slack is washed. The washed ¼ in. slack is carried up an elevator to a conveyor, and passes over a grid to remove some of the water. From here, it runs down a shoot to a shaker, meeting there the ¾ in. and ½ in. The whole then passes through a grinder before elevation into the bunkers. The dirt from the ½ in. and ¼ in. washers is mixed together, passed through a screen, and re-washed, to remove any coal left in.

Summary of Results Obtained in a Humboldt Washer.

—	Main.	Deep Hard.	Heath-cote.	Tupton Nuts.
Slacks, &c., to washer.				
Ash	13·34	16·43	12·55	5·65
Volatile matter	29·08	25·10	29·06	31·27
Sulphur	2·85	3·01	2·19	2·01
Dirt; sinking at 1·45	23·14	26·21	21·54	5·98
After screening, before washing.	¾ in.	½ in.	¼ in.	Dust.
Ash	11·64	19 54	26·56	22·40
Volatile matter	30·02	25 02	22·94	19·96
Sulphur	2·35	2 43	2·98	2·65
Dirt in coal; sinking at 1·45	19·34	24·74	32·82	33·31
After washing.				
Ash	3·70	5·21	8·87	..
Volatile matter	34·13	31·12	30·98	..
Sulphur	2·07	2·18	2·38	..
Dirt in coal; sinking at 1·45	3·21	3·85	8·45	..
Coal in dirt ,, ,, ,,	3 35	22·25	8·83	..
After dirt re-washer.				
Ash	..	4·40	3·75	..
Volatile matter	..	33·05	33·40	..
Sulphur	..	2·03	2·11	..
Dirt in coal; sinking at 1·45	..	3·70	3 56	..
Coal in dirt ,, ,, ,,	..	3·94	3·15	..

DISCUSSION.

Mr. C. P. FINN (Hemsworth) said no doubt in handling a plant which had primarily been designed for making sulphate of ammonia, Mr. Lee would have had the same difficulties as most of them had had. He would like to know whether Mr. Lee had any figures showing what was the proportion of run-back on the liquor treated, because the run-back was additional liquor to treat from the normal quantity that the still dealt with. In his own case, the best he could get was about three times as much as when he was working on making sulphate of ammonia—three times as much in the waste liquor. He would be glad to know, also, whether Mr. Lee had found any difficulty in working the coke-tower for absorbing vapour, which he had seen in the diagram, owing to the height of the tower and the need of getting water to it. He himself had had to pump water up to such a tower; and when, after some time of working, the tower failed to operate as an efficient absorber, and they had to renew the coke, they found it was made almost into solid matter, with a deposit which was mainly carbonate of lime and carbonate of magnesia. He then began to look about for some better method of absorbing the unabsorbed ammonia vapour; and, after consideration of three methods, he had now adopted one which did away entirely with the coke-tower and the refilling process. The refilling was not pleasant to the workmen, who had to wear respirators while doing it, and did not like it at all. In regard to the action of water on fire-brick work, he had had to deal with waste water and evaporate it—not being in the fortunate position of having tips and coal mines, and other means of dealing with it—and the contraction of the evaporators had cost a good deal of money and taken up a lot of time. The fire-bricks or red bricks they had found of very little use indeed, because the bricks had disintegrated. Their evaporators finally were constructed of waste blocks of sandstone, which were obtained from a local quarry; and in working one of these evaporators during the last two-and-a-half years, he had had a peculiar experience. The whole of the composite parts had become covered over with a deposit of sulphate of lime, so that the evaporator inside was like a concrete structure—one big mass of sulphate of lime. This meant that there had been no repairs whatever to do to the evaporator, and it had worked quite efficiently.

Mr. LEE said he estimated the run-back of ammonia brought back from the liming vessel altogether to be 40 p.ct. additional. He had had the same trouble as Mr. Finn in the matter of water. On every side, Chesterfield had grown faster than the water-mains had done. He could not take town water up to the scrubber, so he took pit water up. In regard to what Mr. Finn had planned to do—to connect a pipe up to the suction-pipe of the foul main—he would suggest to Mr. Finn that he was going to have difficulty to prevent getting the suction on to his storage tank; and if he kept a constant suction on to his storage tanks, he was going to lose a good deal of ammonia, which would be taken up in the suction.

Mr. GREEN asked if Mr. Lee had found any increase in the amount of H_2S in his purifying plant just before he started concentrating.

Mr. LEE said he had not found such a difficulty. The H_2S was returned into the same main from the saturator pump. It was really less than it used to be when they were working on sulphate of ammonia. In half-an-hour they could-change over from liquor making to sulphate making, and *vice versâ*.

Mr. B. W. HAIGH said he was glad that the subject of concentrated liquor had come up again. His experience of the temperature of the liquor in going to the plant corresponded with Mr. Lee's. He had found that the temperature was about 38° C. when it started; and the makers said it was quite impossible to work the plant at this temperature. By passing the liquor through a series of tubes, and by air cooling, he got the temperature down from 38° to 20° C. They had great difficulty in keeping the top tray cool. They were quite sure they were losing ammonia, though they did not know how much. Their decomposed gases went from the generators straight up the chimney; so anything that was lost was lost for ever, so far as the ammonium sulphate was concerned. They had now trapped their decomposed gases into the saturator, and used a weak solution of sulphuric acid. The gas bubbled through the saturator as if they were making sulphate; and the foul gas went through the chimney, as before. So they had pretty well assured themselves that they were not losing any ammonia. At one time the concentrated liquor had to be moved about by means of compressed air, which was a very faulty design; but since then they had used pumps, which had brought the loss down to half what it was before.

Mr. LEE said his firm's plant on the original design included two receiving vessels, into which the liquor as it was made had to be run from the absorber; and at periods through the day—which would have meant at least once every shift—it had to be changed from one receiver to another, and the receiver which was full emptied by compressed air into the storage tanks. He objected to this, and said it must be done by gravitation; and it was. They did load by compressed air; and they had a man who did nothing else practically but load the benzol, &c. He loaded with his gauge, and had now arranged it so that he could get his tank full and shut off his air with an excess of air still remaining in the storage tank sufficient by the time it had spent itself to fill the new tank. Thus they avoided having to blow-off any excess of compressed air into the atmosphere.

Prof. O'SHEA said he had been interested in listening to the address of Mr. Lee and the discussion, because he always felt, in his career as a teacher, that the teacher learned a good deal more from the practical man than he did from his books. Might he be allowed to congratulate the coke-oven industry on the manner in which they had risen to the nation's necessity during the great war? When one listened, as they had done that afternoon, to the narration of the story as to how plant which had never been intended for the purpose for which it was used to-day, had been converted to that purpose by (might he say) men who had had no experience in the past of what had proved to be necessary in the present, he felt that the country owed a debt of gratitude to the industry; and those who controlled, and were otherwise engaged in, the industry were to be congratulated on the results achieved. The difficulties must have been enormous. These difficulties had been overcome; and this showed that the coke-oven industry, which, in the past, had been the handmaid of the colliery, had now taken an established place as a national industry—a position which it had always seemed to him was what the industry ought to rise to. He was sure that what the industry had done in the past two or three years was evidence of greater things which it would do in the future. It was difficult for him to discuss the points Mr. Lee had raised, because he had had little or no experience of the recovery of ammonia from the liquors of the coke-oven plant. There was, however, probably one point on which he could speak from experience, and that was in regard to Mr. Lee's remarks about the action of the washer. He had had the opportunity of investigating some coal-washing; and there was no doubt that this was a subject which would repay the attention of all

who had washers, for what was wanted was the standardization of the methods by which the dirt was recovered. He had expected before now to have had some results which might lead to drawing attention to this matter in a really useful way; and he quite hoped that in the future he might be able to put these results together, and perhaps bring forward the matter for discussion. One thing which struck him was how very careful they should be when they put down the washer to see that it was capable of doing all the work required, and also in agreeing what was the standard by which they were going to test the work. They all had their own ideas probably of what the standard should be; but so far as he could make out, it meant that they had to come to an agreement between the constructor of the washer and the user as how they were going to determine the dirt in their washed coals and the coals in the washed dirt. It all rested on a question of terms; and therefore it was better to define these terms a little bit more clearly than had been done in the past. The standard should not be how much dirt was left in the coals, or how much coal was left in the dirt, or what was to be considered free coal or free dirt. The really practical question was, "How much ash am I to have in my final product, in order to make coke which shall be useful?" It did not matter whether it was free dirt or free coal, so long as they got the right ash. The ash was the main thing in the washing of the coal. But, of course, the proportions of dirt in the coal and coal in the dirt were not matters which could be neglected, because they could make the ash as low as they liked, if they left enough coal to the dirt. He had been greatly interested to observe the figures in regard to the quantity of dirt in the wash of ½ in. and ¼ in. coal which had been mentioned by Mr. Lee, and which showed that there was a tendency for the ash to accumulate in the smaller sizes that were washed. Though many, perhaps, might differ from him in this opinion, he always felt that the washer which separated the coal into sizes before they washed was probably doing the job in a better way than the washer which did not separate. So far as he could make out, if they did not size this coal before it was washed, they would have to re-wash the smaller sizes, in order to bring down the ash to what they would want it to be. He might be said, perhaps, to be speaking on this matter somewhat from a theoretical point of view; but he was inclined to think that the theoretical principle would be found to be carried out in practice.

Mr. CHRISP said he was not worried with an ammonia liquor plant, but had something going on in regard to regenerators; and he had proposed tackling the job in a totally different way from what Mr. Lee had done. At the same time, he failed to see why Mr. Lee had not shut-off the regenerator totally. It could scarcely have been of any service, because it was empty for the greater portion of its time; so that it appeared necessary to arrange that he had not the side of the regenerator too hot.

Mr. LEE remarked that this had been done.

Mr. CHRISP said it seemed to him that a great deal of time had been lost; but there might have been reasons why Mr. Lee had worked as he did.

Mr. LEE said at first they had attempted to cut-off one side altogether, and found, as Mr. Chrisp had suggested, that the regenerator on one side got so hot that he was afraid he was going to be in for a bigger job still. They tried various ways of dealing with the difficulty, and eventually decided on the method he had described. The way in which it should be done would depend in each case upon the type of regenerator in use, and other things.

Mr. F. HADFIELD (Wharncliffe Woodmoor) said the renewal of regenerators could be accomplished without any interruption of the working, and had been so done. A length of thirty ovens had been entirely renewed in one week, without any reduction of output. They broke up one on Monday morning, and worked continuously—took out the chequers, renewed the bridge, cut the shell-backs out, and replaced all chequers, and put the gas in again in a week. As a matter of fact, they had even put a new arch on to a regenerator and kept working. The coke-oven construction people had always contended that any repairs of the regenerator necessitated a complete stoppage of the plant; but it was not so.

Mr. GREEN said he was pleased to be again among the members of the Association. During the period that he had been off work he had had a very troublesome time indeed; and he thanked the members very much for the kind message of sympathy which he had had from them.

Mr. Lee was heartily thanked for his address.

Gas Firing and the Glass Industry.—The subject of "Gas Firing and the Glass Industry" was dealt with by Prof. J. W. Cobb in a lecture at Leeds to the Society of Glass Technology. He said that gas-firing was an advance in which many of the industries were deeply interested, the glass industry included. Referring to producers, he remarked that when steam could be used to act upon carbon in the producer the gas was free from nitrogen, and consisted of carbon monoxide and hydrogen, and therefore contained more combustible material. There was, however, a limit to the use of steam, and this had led to important developments in the design of producers. If more steam were used, it had the great scientific and economic advantage of so acting upon the nitrogen contained in the coal that 60 to 70 p.ct. of the nitrogen could be recovered in the form of ammonia. This expressed in terms of money was a substantial asset. Very small regenerative furnaces had not so far been successful. It was, therefore, simpler and cheaper in that case, instead of depending on regeneration and low-grade gas, to use a higher grade of gas. This high grade of gas might be of the water-gas type or drawn from the town-gas supply. Since the war the application of high-grade gas for all such purposes had very much increased, owing to the ease and rapidity of installation. This process would be hastened, if they could only secure that the new standards which must inevitably be adopted for public gas supplies were on a more rational and scientific basis.

FIXATION OF NITROGEN.

In connection with the efforts that are being made in the United States to secure an adequate supply of nitric acid and nitrates, Dr. C. L. Parsons has prepared a report on the various methods in use in different countries.

The conclusion he arrives at is that the United States Government should obtain their nitric acid by the oxidation of ammonia, and should begin the erection of an ammonia-oxidation plant of moderate capacity at an early date, in order to train men and gain experience in the most efficient method of procedure. The Government should proceed slowly in the matter of the erection of plants for the production of ammonia, as developments in the cyanide process and the availability of the Haber process may render valueless within a short time any large expenditure for the production of cyanamide. The oxidation of ammonia requires very little power; and the Haber, cyanide, and bye-product ammonia processes are all independent of cheap power cost. He doubts whether hydro-electric power will be necessary or desirable in three years' time for the most efficient process of fixing nitrogen; and in these circumstances, he considers it would be unwise to instal such power, at great cost, with the sole purpose of fixing nitrogen.

In a subsequent report, according to the "Journal of the Society of Chemical Industry," Dr. Parsons states that a small plant for the oxidation of ammonia erected at Syracuse (N.Y.) is progressing satisfactorily; while another experimental oxidation plant has developed new features. At Syracuse, two novel forms of apparatus for the oxidation of ammonia were then being tried [the report is dated some months back]; and one of these, if successful, will do away entirely with the use of platinum in the production of nitric acid. Also a synthetic ammonia process and a cyanide process have reached a state of development at which Dr. Parsons is prepared to recommend some definite action by the Government. The General Chemical Company, working on the basis that it should be possible to develop conditions under which the synthetic production of ammonia by the direct combination of nitrogen and hydrogen should take place at lower pressures than those deemed necessary under the Haber patents, have achieved success; and the Company have also brought to a commercial basis the production of a mixture of nitrogen and hydrogen from coke, air, and water, which will yield hydrogen at a cost lower than heretofore obtained in the States. This being so, Dr. Parsons recommended the immediate construction of an initial plant to produce 60,000 lbs. of ammonia per day. In view, too, of the development of the cyanide process by the Nitrogen Products Company, he recommended large-scale experiments with this process, which he believes will become a very important factor in the world's nitrogen market, and may prove a strong competitor even of other processes, on account of the simplicity of its operations and the low cost of plant construction.

A Big Industrial Consumer.

A contract for the supply of about 12 million c.ft. of gas per month for factory use has been entered into by the Western Gas Company, of Stockton (Cal.); and the Distribution Superintendent (Mr. D. E. Widdersheim) has given, in the American "Gas Record," some particulars of the purposes for which this great quantity of gas is required. The consumer is a factory in which are made tractors of the "caterpillar" type, which have become famous on the Allied fronts; and the gas displaces distillate in the motor testing and assembling departments, and coke, coal, and oil in other directions. A study of engine-test figures, it is said, leads one to the conclusion that, in so far as heat efficiency of gas is concerned, the adoption of this fuel in place of gasolene or distillate gives equally satisfactory service. Furthermore, the individual tests when gas is used are more closely allied than is the case with liquid fuel, due to the certainty of the measuring apparatus for the gas; while, on the other hand, the gasolene carburettor is liable to small derangement, and in general service does not function equally well at all engine loads and speeds and under the manipulation of different operators. An important fact noted in the use of gas is the uniformity of the character of the exhaust and the regular beat of the engine under every condition; while not the least of the advantages that have so far accrued from gas testing is freedom from smell and noxious fumes in the engine-house. The mixing device consists of a barrel cock 2 in. in nominal diameter of outlet, having a restriction in the centre 1½ in. in diameter. Into the throat projects a gas-pipe 33/64-in. internal diameter, controlled by a hole in the barrel of the cock, which simultaneously controls ten circular air-ports, each 9/16-in. in diameter. Under working conditions, the depression in the throat which acts upon the gas-orifice varies from 2 in. of mercury column at 470 engine revolutions per minute to 3¼ in. of mercury head at 600 revolutions. These proportions have been found to give good all-round results in working, and enable the engine to run at no load equally well as at full load.

Statistics issued by the United States Geological Survey show the world's crude petroleum output for 1916 to have been 460,639,407 barrels of 42 gallons. For the year 1915, the figure was 427,695,347 barrels.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Opening of the New Session.

The inaugural meeting of the new session of the Yorkshire Junior Gas Association was held last Saturday afternoon, at the Chemical Lecture Theatre of the Leeds University. Mr. J. E. LISTER COOPER, the retiring President, presided over a good attendance of members.

ANNUAL REPORT.

The fourteenth annual report, submitted by the Hon. Secretary (Mr. W. H. Riley), recorded eight meetings during the past session, the success of which, considering the difficulties of present times, fully justified a continuance of proceedings during the coming year. The report showed that the ordinary membership of the Association now numbers 122—an increase of 11 during the past year. So far as could be ascertained, 28 members were serving in His Majesty's forces. An adverse balance on the estimate of accounts had to be recorded, accounted for by the extra expense in arranging a larger number of gatherings. The Council wished to thank the engineers of the various works which the Association had been enabled to visit.

The report was adopted, on the proposition of Mr. J. E. SUTTON (Bradford), seconded by Mr. E. GARSED (Elland).

ELECTION OF OFFICERS.

The election of officers resulted as follows :

President.—Mr. Edward Garsed.
Senior Vice-President.—Mr. J. M'Lusky.
Junior Vice-President.—Mr. E. L. Oughton.
Hon. Treasurer.—Mr. Peter M'Nab.
Hon. Secretary.—Mr. W. H. Riley.
Assistant Hon. Secretary.—Mr. E. L. Oughton.
Members of Council.—Messrs. C. Roper, J. W. Roper, A. Edwards, J. W Fell, and E. J. Sutcliffe (Bradford).
Hon. Auditors.—Messrs. Arthur Lister and G. H. Walker.

INDUCTION OF THE NEW PRESIDENT.

Mr. J. E. LISTER COOPER, in relinquishing the presidency, said they had had a successful session, which had called for a good deal of effort on the part of every member. He believed the number of general membership gatherings nearly constituted a record in the history of the Association, and thanks were due to the gentlemen who had contributed to the success of the session by papers or by granting facilities for visits to works. The papers they had had would constitute a valuable addition to the Joint Transactions. He was glad to welcome to the chair, for the new session, Mr. Garsed, who had given much time and energy to the Association, particularly during his term as Secretary. He came to the chair with a valuable asset in inside knowledge of the Association ; and this, coupled with the interest which he had maintained in the Association, augured well for the new year's work. He voiced the hope that the members would rally round Mr. Garsed and give him as good support as, or better than, they had given to his predecessors.

VOTES OF THANKS.

Mr. GARSED, who was warmly received on taking the chair, expressed his appreciation of the honour done him. One of his first, and happiest, duties was to propose a very hearty vote of thanks to the retiring President. The Association owed not a little to Mr. Cooper, who had put much time and effort into his work, in many directions.

The proposition was seconded by Mr. J. M'LUSKY, and carried ; and Mr. COOPER responded.

The PRESIDENT moved a vote of thanks to their retiring officers, who, he said, had had a large share of work in the Council meetings and arrangements for the welfare of the Association. He expressed a fervent hope that he would be the last war-time President.

The motion was seconded by Mr. J. W. FELL, and adopted.

ADDRESS BY MR. W. D. HELPS.

Mr. W. D. HELPS (Messrs. James Milne & Son, Ltd.) then gave the following informal address on the outlook for the future, particularly immediately after the war.

In these times, changes are being made in far more serious lines of life than gas making. I found myself running riot in all directions as to what I could tell you of interest, and which would be fresh to you. As to anything fresh or new, it is difficult to find; and, therefore, with your indulgence, I will endeavour to review a few of the important propositions that we are up-against, and which we hope to bring to a rapid issue, as well as a successful one, immediately we can stop this terrible and murderous war by crushing our enemies.

> Oh ! Peace, your source and soul of social life,
> Beneath whose calm inspiring influence
> Science his views enlarges, Art refines,
> Whilst swelling Commerce opens all her ports:
> Blest be the man divine who gives us thee.

Peace we all want, and a lasting peace. Besides the cost to us up to now of some 5½ thousand million pounds sterling, we have lost many of the flowers of our nation. We realize that we are still combing-out our eligible men for supports of the front line, and we wonder how long this will continue. Peace may come at any hour or it may be years; but we at home must not cease to answer the call, and be ready to welcome our victors immediately war ceases.

PREPARING FOR DEMOBILIZATION.

Demobilization concerns us, our Colonies, and our Allies. It is as important as the war, and calls for the very best considerations of foresight and good judgment. I want in my remarks to be constructive and not destructive. The evils before the war surrounded us, and we shall have others come along. But do let us face them with courage and unselfishness as they arise. We must, as an industry, consider how best to carry on the reinstating of old employees, and to act carefully as well as wisely, when doing so, to those who have temporarily filled posts, as well as to those who have returned in many cases covered with glory, expecting and anxious to take up their old positions as good citizens, and having the goodwill and fellowship of those at home. Let us err on sentiment; but do not let us in so great and serious a proposition sacrifice discipline or duty in carrying out this work. We must remember that we hope to have something like three to four million soldiers to bring home. There is practically more than one-half of our manhood removed for the time being from productive industry.

So far as our own particular section is represented, we have every cause to be proud. While it must rest here and there with an individual who has funked his country's call, many others have made the glorious and last sacrifice of their lives, and will ever live in our memories for their heroism and bravery. Immediately upon the cessation of the war, we shall have our countrymen to bring home, consisting of all classes, who will be landing at our various docks by the aid of our much reduced power of transhipment, and will then have to be forwarded to their own district, as well as in the meantime requiring shelter and food. We must also remember that, through the ravages of war, the conditions of many will be altered and, consequently, wanting different employment from that which they left. Therefore, concentrated co-operation among all of us in the various gas departments, as well as the various manufacturers' works, is an essential. As far as possible, we should endeavour to find all those who desire employment once again in the vicinity of what they have hitherto been familiar with. I suggest the number required to be moved and changed round will represent some sixteen or more millions; for when peace is declared it will, in point of fact, affect every man and woman in this country.

We were not prepared for the war. We must be prepared and ready with as perfect a scheme as is possible at the time of demobilization. If we fail, the danger of peace will be as grave a peril as that of the war. The military authorities will no doubt initiate the first move of demobilization, and then must come the social and industrial bodies. We must see, in the first instance, that the right class of men are returned—those who are efficiently capable of preparing the way for others. As a nation we must do all we can for those returning, who, after risking their lives for their country, demand all consideration, and be prepared still to ration them liberally, and not to aim at seeing how little we must do. As compared with the cost of the war, a few millions to do our duty to them is of little moment. If we do this, we shall start, I hope, quite a new era and a new world so far as peace and goodwill at home are concerned.

The moneyed capitalist, and the capitalist who depends upon his intellectual and physical attainments combined with the knowledge and general aptitude he has acquired—known as the employee—must both start with confidence in each other, putting all their cards on the table, and start from one platform, each being prepared to mete out justice to the other, thereby starting on bed-rock principles of equity—the one paying, and the other producing all in his power at proper rates of wages and having in view the successful meeting of competition by other countries. If we mutually succeed at once in this direction, we shall secure industrial peace between the two classes of capitalists, and, by the then increased output of necessary goods, liquidate our much increased debts, and so bring ourselves once more to that desirable position of normal financial solidity. There must be patience and forbearance on the part of both, as well as regular intercourse with principals and workers. We must see that both work for the productivity of the country.

AFTER-WAR POLICY.

We are all looking for the after-war to bring great changes; but whether for better or worse depends solely upon ourselves. If it gives us confidence in one another, a sound system with a deeper sense of moral obligation, security of human life, then all the sacrifices of our brave men will not have been in vain. Our industrial system before the war was uncontrolled waste, both as regards production and distribution, through needless competition. Organization and co-ordination will alone secure us in the coming crisis, and win years of happiness and of success to England as a nation.

As to the after-war policy of gas manufacturing and selling, I assume that the aim of all interested will be to adopt modern principles, and supply what is in demand both as regards quality, pressure, and price. I would strongly advocate a more general policy of liberal remuneration, not limited perhaps to one or two officers, but given to all capable and painstaking officials. In my observations, moving around as my duties compel me, I do not fail to view with admiration the wonderful good fellowship there is between all members of our industry—little, if any, jealousy, and always a desire to impart knowledge on any particular subject that one may have recently secured from experience to another who is anticipating adopting any particular scheme or arrangement. The capable man of a large works is found ever desirous to help in any way those responsible for the smallest works. May good fellowship long continue in every department, for it spells national success.

To employers I would say, When you are engaging men for the

important positions, be careful—do not be carried away by a cheap man; for if he is a good man and offers himself for a low salary, he is a cheat in not playing the game in relation to his competitors or other aspiring candidates. And if he succeeds, remember that, having once cheated the profession, he will cheat you when he gets the chance. All should demand and get value for their labour and the responsibilities attached to it.

THE RELATIONS BETWEEN EMPLOYER AND EMPLOYED.

I am in favour of Unions, and believe a large percentage of employees are every bit as honest as their employers, and trust each other as much. I am confident that when the men return from the war many abuses and mistakes in policy will be remedied; and it depends upon the future treatment by the employer as much as the employed. We must not, however, tolerate socialism in any form, nor nationalize anything more than is absolutely essential. It is stated that when a man has secured all he wants in money, he preaches honesty, and also when he has made what he wants and retired, he preaches liberality to the workmen. This may be so far true, yet I believe that there are, and always have been, good masters and good workmen. And we must create more of them; for the country will want them more than ever.

So great a man as Mill foresaw that the ideal condition in the future lay not in State-owned factories and mines, uniform wages to workmen, and the abolition of private capital, as the socialists urge, but in uniting the workman and the capitalist in one and the same person. Greater individualism—greater numbers—must create and improve present and future conditions; and any more violent change than this will set us back as a nation. Socialism will not be conducive to this aim.

During the years that I have spent in gas-works and kindred employment, I have seen many changes, and in every case for the better. There was a time when all sorts of deep-laid schemes for an outing or spree were resorted to by the manager; while, on the other hand, there were others who never left their works. But, without hesitation, I say that the former were the best and most successful in their profession in those days; and while there is a far more serious vein come over the successors of that type of man, I say that, to be successful, they must take every opportunity of visiting other works, exchanging their views, and joining and attending various valuable Associations. The other class will tell you "he knows." Why does "he know?" Simply, because he never goes anywhere to know what he ought to know. I suggest to the latter to go about, to join-up in a great and useful industry, and impart to others what he knows, and also to learn what the other fellow knows and can tell him. I am of opinion that the advantages justify both the time and the expense, and that, be it company or corporation, the chief officials should have their instructions on this important matter very clearly defined.

WORK OF THE BRITISH COMMERCIAL GAS ASSOCIATION.

The British Commercial Gas Association from its very commencement has done exceedingly good work. I have had the honour of being closely in touch with it since its inception; and the earnestness of its staff is such that money could not buy. The amount of work and information forthcoming, without money and without price, is simply magnificent; and, in my opinion, any gas department, be it company or corporation, who does not support the Association is wrong, and who only begrudgingly supports it begrudges it only because he does not more closely scrutinize what it is doing daily. I would like to repeat what Mr. Goodenough recently stated:

> The Association is seeking to serve the industry by helping it to serve the nation; and the only "profit" that it seeks is the renewed growing approval and support of its subscribers. There is much work to be done; and the co-operation of all is necessary if the industry is to maintain and enhance its position as a servant of the nation in the difficult days before us.

THE NATIONAL GAS COUNCIL.

The National Gas Council, which has only recently been formed, and which had a good many holes picked in its policy at the commencement, is now, we hope, the great engine of progress to the industry.

FUEL RESEARCH.

The Fuel Research Board has issued its first report, and we are told that we have, in order to come to any decision as to economics or otherwise, to wait a few years before a basis is laid down through this source. This may be quite sane; but may we not in the meantime move along by carefully considering—through the medium, if you like, of the National Gas Council, without in any way interfering with the Research Board—what we have already learned during this war, along with previous experience, and as soon as possible produce cheap and economic power which has in a measure been created in the "Cannon's mouth," and so decide as to whether gas shall be in future created at the pit's mouth or as at present? If at the pit's mouth, will it not spell combination of many towns, so far as linking-up their gas supplies, thereby reducing charges of production as well as distribution, and creating one gigantic corporate body for the supply of gas, and possibly exceeding that great combine across the water known as the Standard Oil Company, who, through the efficiency of their system, saved in one year the sum of £20,000,000.

Are we in this country, and in this particular industry, timid? And, if so, is the cause a fear of disturbing present capital invested in the old system, and the possible reduction in value, as well as the want of courage in those who direct its destinies? Could we move more rapidly? Americans, it is true, are more rapid than we are, and at times have gigantic failures; but are we, on the other hand, really slow? We do not want to seek failures; but we must only grind the implement that will benefit the greater number, and not each one his own little axe. See that we get the very best men as leaders of our industry, and, above that, a more independent and business thinking class in our House of Commons—men who are not put there by a clique, but who go there ostensibly to give of their power for the good of the old country. Let us cut out the old Government officialdom and the officials, and replace them with men of business capacity—men who have won their spurs outside amid the general competition of the common people, be he aristocrat or democrat, and who have travelled commercially and seen things as they are.

Judge Parry recently suggested to an old-time denizen of Whitehall, that the education of a civil servant should include so many years in Manchester, Leeds, and South Wales. He should then visit America, and some European countries, as well as be master of some one public service or industry in each place, and afterwards return to preach a gospel of new ideas to Whitehall. The scheme was pooh-poohed, and the old proverb "a rolling stone gathers no moss" quoted. True, there is plenty of moss in Whitehall; but will moss rebuild this country after the war?

I strongly recommend that those in control of our particular industry should, as far as possible, keep in touch with their customers, and also that they, as well as their assistants, and even junior assistants, should avail themselves of the opportunities in various districts of giving a popular paper on the history or advantages of gas at the winter readings of the little clubs dotted here and there. It is such work as this that causes gas to become more and more popular, as well as being a means of the junior officials particularly gaining knowledge in order to do their best on such occasions, as well as gaining power of speech for anticipated promotion. It is also a means of reducing many prejudices existing only through the ignorance of very desirable customers.

NOTES ON EFFICIENCY OF QUALITY AND DISTRIBUTION.

Perhaps, in conclusion, a few cursory remarks on general principles for the future success and popularity, by efficiency of quality and distribution, would not be out of place.

Gas Supply and Pressure.—Supply gas of the necessary B.Th.U. suitable; and if the Act directs something inferior to what in the expert's opinion is required, and who is directly responsible, please your customers by supplying as the district demands. Having decided this point, see that every means possible is taken to supply this quality, and at a regular pressure, to each customer the twenty-four hours round—one composition of gas at one pressure, and that pressure certainly not less than 25-10ths. This will lead to the success or failure of gas. Price must not be overlooked, and justice to all classes of consumers must be apportioned. I am not sure that this is always done.

Gas-Meters and their Present Length of Life.—I do not want to say more than a word upon this matter. It is this, that the gas authorities have without doubt been far too easy in allowing consumers to adopt, in the majority of cases, much too small a meter, in addition to the fact that it is working to-day in almost every instance double the hours it did in years gone by, as well as measuring altogether a different and much more searching gas or composition.

Naphthalene—the imposter and Will-o'-the-Wisp of the gas supply. My sympathies are with all of you; and I congratulate every one of you for the optimistic airs with which you time and time about review this nightmare. As a boy I heard my father, with other gas engineers, talk of the cure for it. My father has been dead 42 years, and you are all still talking, as well as in many directions doing your best to find a remedy. Should I be exaggerating very much if I said that finding a successful remedy would run the invention of incandescent mantles very closely so far as popularizing the use of gas?

Gas the Poor Man's Friend.—Gas is, after all, to-day the poor man's friend, when compared with the electric light, for lighting, if only from the fact that during the early start on a cold winter's morning the heat-creating incandescent burner gives comfort, while the fire, if there is to be one at that early hour of the day, is burning up.

Gas for Motor Traction.—We could very well devote the whole of the afternoon discussing this very important proposition; but suffice it to say that at present, while one district is chasing the trade and wanting it, the other (owing to more serious demands upon its full output) chases it away. As to system and standard action and charges, this should shortly, after exchange of views and a little more preliminary experience, be arrived at. I am, however, still of the opinion that it is the garage's as well as the owner's job to supply the gas to the car, just as they would petrol, and, in the case of the garage, charge for the same and any other services rendered as hitherto. The gas department must make their own conditions as to the fixing of the service and meter, and possibly would put the consumer on the sliding-scale as to rate to be charged for gas according to the amount used per quarter, which would place the garage depôt upon a fair basis for competition with others in the district. We must not lose sight of the fact that motor owners adopting gas for power may also possibly carry the necessary amount home for domestic and some other purposes.

Standardization.—Standardization of accessories and gas consuming appliances and, may I also suggest as far as possible,

standardization of terms. I am in favour of standards; but do not let us misunderstand our aim. Let me explain what I mean. There are in existence at the present moment buyers who cling to their old heavy patterns, naming them their standards, and insisting upon running them, despite their clumsiness, and refusing to entertain any modification. Each year they ask for tenders—purely as a matter of form (?), for surely no business house would think of considering making patterns without some prospect of being paid for them. They quote accordingly, and hence the lack of competition. Then we have the professional gentleman who still continues to insist upon some little quip or crank just sufficient to prevent standardization, which prevents manufacturing in quantities, or storing in quantities, as well as leading to complication and even error when supplying.

Some years ago I had an American friend over on business, who set out to go round and visit some large buyers of brass work in this country; but finding every town in this particular line had its own fads, he became very irate, and went back in less than six weeks, though he had set out for six months. I have never seen or heard of him since.

The Press.—The right of the Press to discuss public affairs was established in 1764; but not till 1835 did Parliament frankly open its doors to reporters. It is not, however, recorded as to the exact date we, as the gas industry, allowed the Press freedom of action. But to this I trust we all agree—viz., that we have no cause to regret having done so; and, furthermore, that, so far as our particular Technical Press is concerned, we have to thank them for their fair and impartial criticisms, which have always struck me as criticisms of what has proceeded from the mouth of man and its relative importance to the industry, rather than the man no matter what his position may be. Furthermore, they are always alive, keen, and alert in helping us along, and at times may appear severe. But that is a means of keeping our thoughts and minds healthy as well as strong.

In conclusion, I would like to add that I feel it an honour to have been asked to address you to-day, and at the same time realize my inability to incense you to greater things than you have done in the past. But I do assure you that, if only for the kindness I have received in years gone by from many of the rank and file, as well as many of the head officials connected with the industry, I am here in Leeds to give one and all juniors any advice and stimulant that I am capable of giving. I cannot overlook the fact that the student or junior official or subordinate of to-day is the possible director of matters of to-morrow of the industry. Should any, however, by chance be switched-on to a side line by a competitor for honours, who is designed to be more fortunate and not necessarily any more capable, and thereby stunt your career and prevent your making that progress and attaining that higher position that you aspire to, stand loyally to the good cause, help it forward, and when the sun sets you will be satified that you have always at least tried to do your duty.

DISCUSSION.

The PRESIDENT said he felt somewhat at a loss as to how to comment on such an address. They had no intention, of course, of really discussing or of criticizing it; but they had had put before them some useful directions of thought, and possibly some members might like to endorse, or perhaps even disagree with, Mr. Helps's views.

Mr. J. E. LISTER COOPER (Yeadon) said the address would certainly act as a great impetus to them all to put forth greater effort in the future conduct of their work. In regard to the National Gas Council, it had deserved a good deal of the criticism earlier on, though it had undoubtedly improved. It had just been labouring very hard on the question of financial hardships of gas undertakings during the war, and had arrived at certain proposals which were put before the Board of Trade by deputation. There had been some inclination to blame the National Gas Council for the lack of fruit which seemed to come of this; but he thought the real blame was to be shouldered by the Board of Trade, who were, he maintained, not giving fair consideration to the gas industry. They seemed to grant all their favours to the electrical industry. As Mr. Helps said, gas was the poor man's friend. When one realized that only 5 p.ct. of coal efficiency was utilized in electricity, whereas when used as gas 22 p.ct. was utilized, the official attitude was surprising. It was not fair that there should be so much partiality to the electrical industry. He had heard it said that the gas industry was now picking up somewhat in the opinion of the powers that be at Whitehall, as some recognition of the great work it had done for the nation during the war. He agreed with Mr. Helps's disfavour of the prospect of a union for gas managers. His idea of the best way to see that managers get better salaries was to see that assistants get good pay; and then there would be no more assistants applying for managerships at low salaries. As to the Government's treatment of the gas industry in the matter of coal prices, he could see no justification whatever for the recent addition of half-a-crown per ton, unless it was that, as the country wanted money, the Government saw fit to take an undue advantage of coal users and the gas industry in trying to reap a bit of extra revenue from the profits made from coke. He moved a hearty vote of thanks to Mr. Helps for his address.

Mr. J. DEMAINE (Ripon) said, in regard to Mr. Helps's remark as to meters being overworked to-day, there was a lot of truth in this up and down the country, owing to the vastly increased gas consumption in munition and other industrial areas. He had had experience of some striking instances, in his own undertaking, of pre-war time meters being hopelessly overworked. They found meters being constantly overloaded, and it was worth while for gas engineers to search very thoroughly into complaints.

Mr. W. WALKER ATLEY (Normanton), in seconding the motion, said there was much food for thought in the address, and they would doubtless better appreciate it when they could read it in the "JOURNAL" before their own firesides. He was sure that all Mr. Helps had said would bear fruit, and the members would prove themselves better men in the industry for it. Mr. Helps's ideas about demobilization were very much justified.

The PRESIDENT said one section of Mr. Helps's address had emphasized the great need for forbearance on the part of both masters and men. He thought surely most of the members of the Association had for some time past had some considerable experience of what patience and forbearance meant. They must bear it still further in mind for the future which had to be faced. They should thank Mr. Helps particularly for his observation that, in moving around in the course of his duties, he had not failed to appreciate the wonderful good fellowship and readiness to give mutual help among the members of the gas industry. As to unions for managers, Mr. Helps remarked, "There are good employers and good workmen." The question was, What was to be done with the others? On the matter of further utilization of gas, he felt that the sooner the country realized the value of its coal, and accepted the fact that burning in open fires was a wicked waste, the better for the nation. Would not gas be so much more the poor man's friend if he simply had to put a match to his incandescent burner for all purposes, instead of to the open coal fire—if the universal adoption of gas for lighting, heating, cooking, and everything else were brought home to the public?

Mr. E. J. SUTCLIFFE (Bradford) asked what Mr. Helps meant by his remark on demobilization, "We must see to it that the right class of men return first."

Mr. HELPS, in reply to the discussion, answered Mr. Sutcliffe's question at the outset. He said he meant that it would be no good sending home first a lot of men, semi-skilled or not trained at all, to a country which had been neglected for a considerable time. As it was quite likely we should have to keep a very great standing army, the authorities should send home first the skilled men, and the others later, when the country was getting straight. He had purposely omitted to deal with the coal situation, thinking it hardly within his province. He fancied there was some truth in Mr. Cooper's remarks; but, after all, the powers that be had to get money from somewhere. He must confess that he was of opinion that the extra half-a-crown was not going to benefit the colliery owners to any appreciable extent. On the other hand, it was not going to do any serious harm to the gas manufacturer or the gas consumer—the latter of whom, of course, would have to pay. Therefore, if it was an indirect way of touching a little more money to keep as low as possible the tremendous expenditure on the war, he did not think it was a bad move. [Mr. COOPER: What about the gas shareholder?] He hoped, and, in fact, believed, there would be some amendment to cover the party in the sliding-scale. Honestly, he thought this half-a-crown business was quite a clever dodge on the part of the authorities. In regard to the Board of Trade, the closer one got to these public bodies the more one must realize the great amount of good work they did, particularly in view of the fact that they were now dependent largely on "scratch teams." One must not be too hard upon them in criticism. The same observations applied to the National Gas Council, where they had now very busy men who did their best for the industry. Mr. Demaine's instances of overloaded meters could be multiplied by the million to-day. He was glad to hear Mr. Atley's remarks, because the matter of demobilization was the greatest they would have to face for a long time. They must aim to get gas down in price after the war to a much lower level, and then they must boom the general adoption of gas appliances.

On the motion of Mr. SUTCLIFFE, seconded by Mr. PETER M'NAB (Bradford), a vote of thanks was accorded the Leeds University authorities for their loan of the theatre for the Association's meetings.

THE GUESTS OF MR. HELPS.

The party then adjourned to Collinson's Café for tea, as the gusets of Mr. HELPS, who presided.

After the repast,

The CHAIRMAN gave voice to a kindly thought by a graceful request to the company to give a few moments' silent thought for the welfare of the 28 members absent on active service. "May they safely return" was his simple expression of hope after a brief silence.

The PRESIDENT, in moving a vote of thanks to Mr. Helps for his hospitality, said their host had set the ball of the 1917-18 session well rolling; and he hoped that throughout the session, despite the difficulties of the times, there would be attendances as good as they had that day, to maintain the standard to which the Association had attained. He mentioned that members—more particularly those members who rarely spoke—had better prepare themselves for a little shock, because he proposed, during the session, to call upon any individual to give his opinions of a paper read. There were many potential exponents of useful thought who must be made to overcome their shyness; and he could assure them that they had only to get up and speak once—even if they thought they said something useless—to want of their own accord to get up again.

Mr. SUTCLIFFE having seconded the proposition,

The CHAIRMAN briefly responded.

Conservation of Fuel Reserves.—Mr. J. B. C. Kershaw, in a paper which he read before the Liverpool Engineering Society on the "Conservation of our Fuel Reserves by the Use of Low-Grade Fuels for Power Generation," said that practically all fuels containing 60 p.ct. or over of combustible matter could be used with advantage for power generation either directly under steam-boilers or by preliminary gasification in special forms of producer; their fine state of subdivision or production of an easily fusible ash being no bar to this application of them. If these fuels could be utilized for power production, and if, on the other hand, very large quantities of such fuels were being left in the coal mines, there would appear to be a good opportunity for large fuel consumers to benefit themselves and the community by creating a demand and market for these much-neglected low-grade fuels.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Most Economical Method of Carbonizing Coal.

SIR,—Mr. John West's "facts," submitted in his inimitable style, would not have induced me to reply to his letter, had they not contained two inaccuracies which I am in a particular position to contradict.

First, when he accuses me of disregarding the President's wishes at the meeting of the Southern District Association of Gas Engineers and Managers, I wish to make it quite clear that Mr. Westlake, the President, is a close and valued friend, and what I did was done with his approval.

Second, the scheme of lowering the temperatures was not withdrawn at all as a result of anything that Mr. West pointed out to the "powers that be."

For the rest, I leave it to your readers to judge whether Mr. West's contention can be accepted, that, with low-temperature carbonization, double or treble labour per ton of coal would be required. Personally, I am not convinced.

Also, I think it is generally agreed that the most suitable temperature of distillation for the maximum yield of tar depends upon several factors. Given an abundance of carbonizing plant and sufficient coal, it is certain more tar per ton can be obtained by low than by high temperature carbonization.

In conclusion, I may remark that I am in full agreement with the leading article on the subject in the last number of the "JOURNAL;" and so the matter may be considered as ended, so far as I am concerned.

W. DOIG GIBB.

Nov. 21, 1917.

Mr. West Replies to Mr. Marshall.

SIR,—I am glad to see that my old friend Mr. F. D. Marshall has stepped into the arena. I should first of all state that I am not going to be drawn into a discussion to define or designate the limits of both high and low temperature carbonization, as there does not appear to be any finality to this question. Everything depends upon the necessary and suitable heat being applied for the various objects for which the carbonization of coal is required.

As to Mr. Marshall's advice to Mr. Barton, I am sure that that gentleman is perfectly satisfied with the results of the investigations undertaken by myself, with Dr. Perkin and others, in connection with the great scheme he has in view; and I have no doubt that Dr. Perkin would not advise, or propose to him, to waste valuable coal by leaving 7 to 12 p.ct. of volatile matters in the coke.

Assuming that Mr. Marshall may be desirous of comparing the results of his tests with those of mine on Kent coals, he must know that, before any comparisons are made, he must first give us the analysis of the coals he tested, the same as I did in my paper. I take this opportunity of stating that my experience proves that tests on a small experimental sample of coal are not comparable with extensive tests carried out on a working basis, and with a large quantity of coals.

Before commencing the tests on the Kent coal, I was provided by a representative of the Kent Collieries with an analysis of the coals of which a small sample had also been tested by Dr. Perkin. The analysis showed that the coal contained over 30 p.ct. of volatile matter. But unfortunately the coal actually supplied in bulk from the collieries was very much inferior to the original samples; and when analyzed by independent experts gave the following average results:

Kent Coal—Tilmanstone Seam.

Moisture	1·57 p.ct.
Volatile matter	19·83 ,,
Ash	14·10 ,,

Kent Coal—Snowdon Seam.

(Average of several samples analyzed.)

Moisture	1·80 p.ct.
Volatile matter	21·00 ,,
Ash	22·33 ,,

Mr. Marshall refers to the excellent quality of the coke produced in his experiments, assumes that this coal could not be carbonized in continuously worked vertical retorts, and states that it would be too friable and would yield much breeze by the moving operations. I beg to differ entirely from this speculative and unwarrantable opinion, as I have not yet come across any coal which could not be satisfactorily carbonized in our vertical retorts. The coke produced with my experiments with the Kent coal was above the average quality. It was not, as Mr. Marshall insinuates, friable, nor did it yield breeze. Our report to the Company on this coke states that, "although the coke was high in ash, it was hard, and otherwise of a splendid quality, and did not clinker. It was particularly well adapted to fire the producers for heating the settings.

With regard to the quantity of sulphate of ammonia produced per ton, Mr. Marshall very crudely suggests that the figures in my table may have been transposed. The figures given are quite correct, and were checked with very great care by the experienced staff who conducted the tests.

I should like here to state that the object of my paper is to assist the gas industry in fulfilling the special requirements of producing gas for lighting, heating, and power purposes on the most economical and commercial lines. Mr. Marshall does not appear to be working in the same direction; and, in my opinion, he has ignored the conditions with which the gas industry has to comply—conditions with which I am sure he is fully acquainted.

If Mr. Marshall advocates low-temperature carbonization for general gas-works' practice, he should be prepared to submit figures showing the commercial advantages of the system, and to prove that the working results will enable gas engineers to satisfactorily meet the necessary demand for gas and residuals.

I have read Mr. E. J. Wellens' letter; and I am pleased to note that he confirms most of the experience given in my paper.

While entirely disagreeing with the conclusions drawn by your correspondent "Char," I beg to inform him that it is not my practice to reply to anonymous correspondence.

JOHN WEST.

Southport, Nov. 24, 1917.

Views of Mr. West's Paper.

SIR,—"The war has brought about many remarkable changes in our ordinary habits and methods of working." Such were the words used by Mr. John West in the opening of his paper. It would seem almost appropriate to substitute the word "extraordinary" for ordinary, as being more fitting to omissions of the past; for surely what follows in results given sets condemnation on all past attempts at the carbonization of coal.

The remarkable war development in the science of the carbonization of coal almost attempts to dwarf 35 years of retort-house experience, and devotion to coal carbonization appears to be a sheer waste of time. There are, however, a few poignant facts in old practice still remaining much the same in the new practice—viz., the scientific carbonization of coal. The data following are based on observations in working—memories of records which may be taken generally as approaching approximates.

Whatever percentage the volatile matter content in a gas coal represents, the methane content in the volume of gas obtained is usually within the range of a few figures of being the same—say, 26 p.ct. to 32 p.ct.—providing the analysis of the gas is an average covering the whole period of time in carbonization obtained by decent working conditions.

If a volume of gas of (say) the following percentage composition—CO_2, 3; HC, 3; O_2, 0; CO, 8; CH_4, 56; H_2, 28; N_2, 2—be passed through hot coke (say heated to 950° C.) we change the composition to something like the following: CO_2, 2 p.ct.; HC, 2·5; O_2, 0; CO, 8; CH_4, 34; H_2, 52; N_2, 1·5. This increases the volume to (say) 10 to 12 p.ct.

Coal gas in its composition in the first hour of carbonization, as compared with the last hour of its period of time, varies thus: Hydrogen increases from 20 to 67 p.ct.; methane decreases from 57 to 22 p.ct.; and the heavy hydrocarbons decrease from 11 to 2 p.ct. With a difference in temperature of (say) from 400° C. to one of (say) 900° C. inside retort temperature, the hydrogen may increase from 22 p.ct. to 55 p.ct.; the methane may decrease from 58 to 35 p.ct.; and the heavy hydrocarbons may decrease from 5 to 2·5 p.ct.

As affecting the yield of tar generally and approximately, the quantity obtained with a retort temperature of (say) 1000° C. would be doubled by reducing the retort temperature to (say) 500° C.

The above may very justly be claimed as "remarkable changes." They are not given in any spirit of criticism, but as bearing on certain results detailed in Mr. West's paper, yet in extremely different proportion, as analyses of the figures of tests show—see the accompanying table. The most prominent result will be found in Table I., Kent coal, where with only a volatile content in the coal of 19·12 p.ct., in the volume of gas obtained there is the very high total hydrocarbon content of 41·4 p.ct., and against the gross calorific value given as being actually 441 B.Th.U. the calculated calorific value of the combustibles is no less than 608 B.Th.U.

Table.	Coal.	Moisture.	Volatile Matter.	Ash.
		Per Cent.	Per Cent.	Per Cent.
I.	Kent.	1·95	19·12	11·21
IV.	Haigh Moor	2·29	31·64	6·37
VI.	Orrell Nuts	3·9	36·0	3·72
VI.	,,	,,	,,	,,
VII.	,,	,,	,,	,,
VII.	,,	,,	,,	,,

Table.	Working Temperature. Deg. C.	Make per Ton. C.Ft.	Calorific Value. Gross.	Calculated Calorific Value. Gross.	Composition of Gas. CO_2.	HC.	O_2.	CO.	CH_4.	H_2.	N_2.	Total Hydrocarbon. Content.	Combustibles. C.Ft.	Incombustibles.	—
												P.ct.	P.ct.	P.ct.	
I. . .	1400	11,491	441·1	608	1·6	2·5	0·5	5·3	38·9	44·2	7·0	41·4	90·9	9·1	No steaming.
IV. .	1362	14,050	556·0	524	2·0	3·0	0·9	6·1	26·4	52·8	8 8	29·4	88·3	11·7	,,
VI. .	1393	14,084	522·0	527	1·9	2·6	0·3	12·0	26·1	51·6	5·5	28·7	92·3	7·7	,,
VI. .	1397	15,487	506·0	478	3·3	2·2	0·2	16·2	20·7	51·9	5·5	22·9	91·0	9·0	Steaming 25 lbs. pressure.
VII. .	1387	16,607	505·0	480	3·7	2·2	0·3	17·1	20·8	51·2	4·7	23·0	91·3	8·7	,, 40 ,, ,,
VII. .	1415	17,460	494·0	470	3·5	2·1	0·3	21·4	18·8	50·8	3·1	20·9	93·1	6·9	,, 45 ,, ,,

The Haigh Moor coal, with a volatile matter content of 31·64 p.ct., is only credited with a total hydrocarbon content of 29·4 p.ct.; and, similarly, Orrell Nuts, with a volatile matter content of 36 p.ct. (see Dr. Colman's tests), has even a less amount of total hydrocarbons—viz., 28·7 p.ct. All three tests were made under non-steaming conditions.

In Table VI. both tests, also Table VII. second test, the quantity of coke per ton is not given.

It would have been intensely interesting to have known the difference in weight of hot coke between non-steaming, and steaming, and especially steaming at pressures of 40 lbs. to 45 lbs. These omissions leave the tests incomplete as well as the interest they so justly deserve.

THOS. SETTLE.

Leeds, Nov. 22, 1917.

Steaming and Blue Water Gas in Verticals.

SIR,—The recent papers and discussions on the application and results of "steaming" in vertical retorts have provided some very interesting information. Messrs. West and Blundell are to be congratulated on the very excellent results obtained. As a user of both vertical retorts (Woodall-Duckham type) and horizontals, I am naturally interested in the discussion; and I was glad to read both Mr. Wellens' and "Char's" contributions in your last issue, as their experience coincides with my own.

There are undoubtedly two very important factors for consideration, which govern the success or otherwise of "steaming" in continuous verticals, in order to obtain higher yields per ton of coal carbonized—

1.—The physical property of the coal used.

2.—Heat control of the setting.

Upon the physical property of the coal, the success of "steaming" absolutely depends. As Mr. Wellens points out, the heat much more readily penetrates the charge when nuts or good screened coal are used, and a higher throughput is obtainable. Mr. West also confirms this experience; for in his paper, referring to Kent coal, he says: "With an ordinary fair gas coal, working at high temperature, about 4 tons and upwards were passed through each retort per 24 hours; but on account of the low percentage of volatile matter and large percentage of ash in Kent coal, only 2·69 tons of this coal could be passed through the retorts per 24 hours—*i.e.*, 50 p.ct. less work per retort than normally." I have carbonized all types of coal, from good Yorkshire washed nuts to Durham slack; and the throughput per retort has varied from over 5 tons using the former, to 3 tons with the latter.

These points strongly emphasize the necessity of very seriously considering the effect of plant capacity in relation to peak load. To my mind, this point constitutes one of the greatest drawbacks to the vertical retort system—the physical property of the coal has to be specially adaptable to the retort, in order to achieve efficient carbonization at a minimum cost.

At the present time, I am using coal containing at least 80 p.ct. of slack; and I have tried "steaming," with the same experience as Mr. Wellens. I had to cut down the pressure to 3 lbs., in order to obtain a gas with less than 2½ to 3 p.ct. of CO_2. Having regard to the fact that I had to reduce the speed to increase the heat, the effect upon the total productive capacity of the plant was appreciably lower; so I decided to obtain as large a throughput as possible, and mix blue gas separately generated in the water-gas plant. There is not the slightest difficulty in making a good blue gas of over 300 B.Th.U., if the blast and steam pressures are well balanced. I hope, when time permits, to pass superheated water gas through the verticals. Although the cost may be slightly greater, the advantages of "steaming" may possibly be obtained.

The heat control of the setting plays a very important part. In the Glover-West system, there appears to be no difficulty in obtaining a sufficiently high temperature to decompose the steam, leaving a minimum CO_2 content. The bottom temperatures attainable in the combustion flues are really critical temperatures for the Woodall-Duckham system, the top being about 2400° Fahr., and the bottom 1700° Fahr.—very favourable conditions for high CO_2 content. Where lime purification is in vogue, the question is of vital importance. However, by simple modification of the heating arrangement and the introduction of silica material, there is apparently no reason why the Woodall-Duckham types could not be suitably heated. From what I have already pointed out, physical property of coal, geographical position, and plant capacity would mean modifications of design.

I was glad to see Mr. West's comparative analysis of tars for benzol and toluol content. It would have been very interesting if Mr. Blundell had supplemented his analysis of tar with similar analysis of horizontals. From my own experience, I feel we have not quite settled the tar problem in the two systems.

The valuation of tar will have to be seriously handled in the future. The day for dumping tar into a distiller's works at so much per ton, irrespective of what it contains, should very soon come to an end. It should be sold on its analysis. There are other constituents besides benzol and toluol which need consideration from a commercial point of view. I refer to solvent naphtha, carbolic and cresylic acids, &c.—products yielding high prices per gallon. What are the comparative values of the tar per ton, also the saleable value of pitch?

Although gas, plenty of it, of good calorific value and a definite maximum amount of inert constituents, is the primary object, there are a multitude of factors to be taken into serious consideration before the verdict is given in favour of one system over the other.

GEO. H. ELLIOTT.

Portsmouth, Nov. 22, 1917.

Price of Gas at Halifax.—The Halifax Corporation Gas Committee propose to raise the price of gas 3d. per 1000 c.ft. from December, making the total price 2s. 10d. for lighting, 2s. 3d. for domestic purposes other than lighting, and 1s. 6d. to 2s. 3d. for power. The forthcoming increase of price is made necessary by the additional 2s. 6d. per ton advance in coal.

REGISTER OF PATENTS.

Production of Gas from Peat, Lignite, or Wood. No. 101,152.

RASMUSSEN, C. O., of Copenhagen.

No. 11,136; Aug. 7, 1916. Convention date Aug. 8, 1915.

By this invention, gas is produced from peat, wood, &c., in the usual manner in closed retorts or retort kilns, and the gas as developed is again passed, together with steam or hydrocarbon vapours, through one or more retorts containing substances mainly consisting of carbon maintained in a state of incandescence. For this purpose, the coke residue or charcoal obtained by driving off (wholly or in part) the volatile matters and gas of the carbonizing coal, peat, wood, &c., may be used. In this way, carbon monoxide is formed from a portion of the carbonic acid.

In order to produce a greater quantity of usable gas and to promote the formation of carbon monoxide in the gas, water vapour is conveyed to the retort in which the reduction of the carbonic acid takes place; and, in addition to carbon monoxide, greater quantities of hydrogen will also be formed by the process.

The production of gas as described may, the patentee points out, take place in gas-works which are ordinarily used for producing coal gas, as only small and unimportant or inconsiderable alterations of the gas-works' plants are required. Likewise the production of coal gas and the producing of gas from peat or wood as described may take place at the same time in the same works, as some of the retorts in a retort-bench, or some of the benches of retorts, may be used for producing coal gas, and others used to produce gas from peat, &c., by the process according to the invention.

Mantles for Incandescent Gas-Lamps.—No. 109,695.

KEITH, J. & G., of Farringdon Avenue, E.C., and ROBIN, J. T., of Streatham, S.W.

No. 16,135; Nov. 10, 1916.

The patentees remark: In the use of high-pressure gas-lamps provided with inverted mantles (which are relatively long compared to their diameter), there is a tendency for the mantle, when burnt off and formed on the lamp itself, to assume a bulbous shape at the lower end—thus having less lighting efficiency than mantles which are either parallel-sided or slightly tapered towards the bottom. They are also liable to wear thin and break out at the lower end, where they are weaker than at the sides or top. These drawbacks are attributable to the circumstance that, owing to the high velocity with which the flame issues from the nozzle (mainly in the direction of the lower end of the mantle), there is a tendency for a higher static pressure to be set up near the bottom of the mantle than exists higher up—the static pressure gradually decreasing towards the top of the mantle. With the higher pressure near the bottom, there is a greater velocity through the meshes of the mantle at its lower end, and also a higher state of incandescence at the lower portion, while the upper portion of the mantle does not become sufficiently incandescent. Hence the greater wear and tear of the mantle at the lower end; the attenuation continuing until the fabric gives way—forming holes, which subsequent erosion rapidly widens.

With a view to minimize these defects, mantles made of different fabrics, offering a high resistance, have been tried. The patentees' proposal to overcome objections is to so form the mantle that the size of the meshes diminishes progressively from the upper end. This result is attained by gradually shortening the length of stitch in the knitting as the lower end of the mantle is reached; while, in order to avoid the formation of a heavy and close lump at the extreme end of the mantle, the last rows of knitting which form the closed end of the mantle are made with relatively longer stitches. It is a fact, they assert, that the shorter the stitch the greater the capacity of the mantle to resist tube-stress; so that a mantle produced as described is better able to resist the tendency to become bulbous at the lower end. Obviously also the portion of the mantle formed of short stitches offers a higher resistance to the passage of the flame than would the same area made up of longer stitches.

Water-Gas Plant Blower Regulator.—No. 109,885.

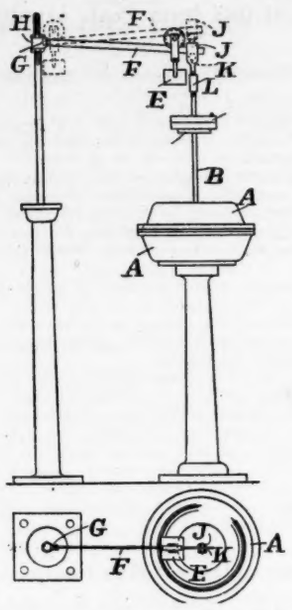
MITCHELL, J., of Birkenhead.

No. 16,638; Nov. 21, 1916.

This device has been specially designed for use in connection with the blowers of carburetted water-gas plants; the object being to obtain an automatic variation of the loading of the diaphragm, and to effect an economy in the running of the blower.

The casing A contains the diaphragm, the upper side of which is exposed to a vacuum, or the underside to gas pressure; the casing also containing an air cushion which serves as a dash-pot to the governor. The central stem B is common to both the diaphragm and dash-pot. A permanent loading of the diaphragm is provided for by one or more weights on a tray fixed to the stem; and the motion imparted to the diaphragm by any change of vacuum or pressure is transmitted to the steam throttle-valve by (say) a bell-crank lever and rod [not shown]. In addition to the permanent weights, there is a sliding or rolling weight E, which is automatically added to, or removed from, the permanent weights, so as to provide automatic loading or unloading on the diaphragm. The weight E can be hung on an arm F pivoted at one end to a head-piece H. The arm F forms a track for the weight E, and is reciprocated by the stem B, so that its upward movement raises the free end of the arm on its pivot G into a position sloping downwards towards the pivot, as shown by the dotted lines. Thus the weight will be caused to slide down the arm towards the pivot into a position away from the stem, and so lessen the load on the tray. The

head-piece H, to which the arm or track is pivoted, is supported in a fixed position, but is adjustable perpendicularly by a screwed spindle I, so as to enable the position at which the weight will begin to recede from the tray to be regulated when the diaphragm rises above its



Mitchell's Automatic Water-Gas Blower Regulator.

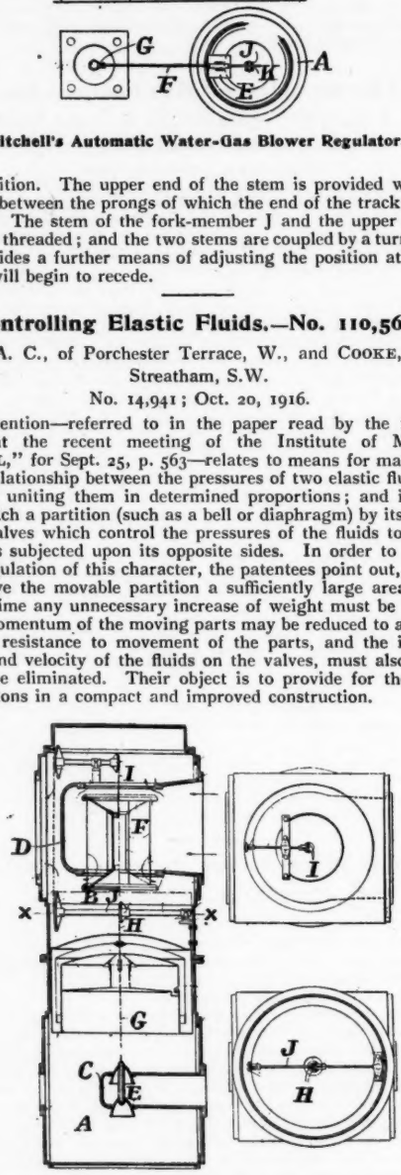
normal position. The upper end of the stem is provided with a fork member J, between the prongs of which the end of the track F rests on the pin K. The stem of the fork-member J and the upper end of the stem B are threaded; and the two stems are coupled by a turn buckle L, which provides a further means of adjusting the position at which the weight E will begin to recede.

Controlling Elastic Fluids.—No. 110,568.

IONIDES, A. C., of Porchester Terrace, W., and COOKE, S. V., of Streatham, S.W.

No. 14,941; Oct. 20, 1916.

This invention—referred to in the paper read by the first-named patentee at the recent meeting of the Institute of Metals, see "JOURNAL," for Sept. 25, p. 563—relates to means for maintaining a constant relationship between the pressures of two elastic fluids for the purpose of uniting them in determined proportions; and it is of the type in which a partition (such as a bell or diaphragm) by its movement operates valves which control the pressures of the fluids to which the partition is subjected upon its opposite sides. In order to have satisfactory regulation of this character, the patentees point out, it is necessary to give the movable partition a sufficiently large area; while at the same time any unnecessary increase of weight must be avoided, so that the momentum of the moving parts may be reduced to a minimum. Frictional resistance to movement of the parts, and the influence of pressure and velocity of the fluids on the valves, must also, as far as possible, be eliminated. Their object is to provide for the foregoing considerations in a compact and improved construction.



Ionides and Cooke's Elastic Fluid Controller.

A sectional elevation of one form of the apparatus is given; also a plan with the top cover removed, and a section on the line X of fig. 1.

A tower-like structure formed of lower and upper rectangular members A and B, having cylindrical extensions connected by flanges, and the whole, surmounted by a cover, is provided with two double-beat valve-boxes C D arranged with the valves E F in line vertically one above the other and at some distance apart. These valves preferably open by a downward movement; and in order to reduce the inertia of the moving parts to a minimum, they are made as light as possible consistent with the necessary rigidity. One or both valves may be constructed (as shown in the upper part of the figure) of two hollow frusto-conical members supported upon a central column and braced together by tension rods or wires evenly distributed around the circumference of the valve, just within the seats which are formed on rings of somewhat stouter section pressed by the tension wires in contact with the periphery of the frusto-conical members.

In the central portion of the casing (between the two valve boxes) is a horizontal fluid-tight partition dividing the case into an upper and a lower compartment, each containing a valve. The partition, as illustrated, forms the top of an ordinary gas bell, the sides of which are accommodated in an annular tank containing sealing medium, such as oil. The bell is of the lightest possible construction; and the tank is provided with supporting members adapted to protect the top of the bell should it be subjected to any undue stress. Apertures in these members allow access of the fluids to both sides of the top of the bell. A chamber may also be formed below into which liquid will flow if the seal is blown by excessive pressure, and from which it may drain back into the tank through a ball valve.

The apparatus is arranged to control the gas by means of the lower valve and air by means of the upper one. The gas-valve E is therefore of considerably smaller diameter than the air-valve F—say, in the ratio of about one to three. It is desirable, however, to allow both the valves to have an equal vertical travel for the purpose of maintaining the best balance conditions. Under these circumstances, the gas-valve is fitted with parabolic plugs extending beyond the seatings into the openings and regulating the amount of cross-sectional area of the valve orifice, so that a constant proportion between the distance moved and the area of passageway is maintained at all positions of the valve travel.

In the event of low quality or power gas being used, the quantities of gas and air in the mixture are substantially equal, and both the valves E F and their boxes C and D may be of the same diameter.

The lower valve is directly connected by a tension member or the like G to the centre of the under side of the movable bell. It should preferably only be flexible at two points, and should have a guide in order that no pendulum or oscillatory motion is engendered. From the centre of the upper side of the bell a double flexible tension member H is connected to a quadrant fixed at the centre of a horizontal lever above the bell and supported at its end by needle points—one in a conical cavity and the other in an angular groove or slot upon each side in the fulcrum studs.

The upper valve F is suspended by a double flexible tension member I passing over a quadrant upon the end of a horizontal lever positioned above the upper valve box. This lever is pivoted at one-third of its length from the end from which the valve is suspended; and it is supported by a bar attached to the valve box D. From a quadrant upon the opposite end of the top lever a tension member is carried downward to a quadrant upon the end of the lever J; this member being preferably a rod having at each end a sufficient length of flexible material (multiple link chain) to accommodate the arcs.

By means of this system of levers and flexible tension members an upward movement of the bell results in an upward movement of the lower valve E and a downward movement of the upper valve F. If, therefore, the pressure of the fluid passing into the lower compartment exceeds the pressure of that passing into the upper compartment, and the bell moves upwards as indicated, the lower double-beat valve will be moved towards its seat, and therefore check the flow of fluid through the lower half of the apparatus, and thus act to reduce its pressure. At the same time, the upper valve will be lowered—thus increasing the area available for fluid to flow into the upper compartment and tending to increase the pressure therein.

By a suitable arrangement of the weights of the two valves, the bell, and the levers and connections, the whole system may be placed in a perfect state of balance; and by reducing the moving weights to the smallest amount and eliminating as far as possible the friction attending the movement of the parts, the device may be made to operate with minute pressure differences, and to maintain practical uniformity between the pressures of the two fluids issuing from the upper and lower compartments. By varying the weights on the opposite sides of the balance, any desired ratio between the pressures of the two fluids may be constantly maintained.

Automatically Shutting-Off the Supply of Gas.

No. 110,572.

BROUCHER, D., of Cardiff.

No. 15,027; Oct. 23, 1916.

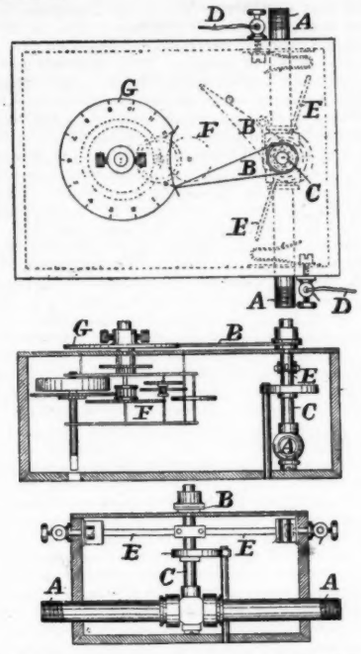
The object of this invention is to employ a revolving semi-circular disc, set in motion by the portion of a clock which is necessary to measure time—not any portion of an alarum clock which has reference to the ringing of a bell.

A plan of the whole contrivance is given; also a part-sectional side elevation, and a part-sectional end elevation.

A is the gas supply pipe provided with a tap the plug of which is adapted to be forcibly rotated from an open to a closed position by a spring when a lever B, secured to the spindle C of the plug, is released. The electricity is supplied by the leads D transmitted by contact springs when the ends of a lever E (also secured to the spindle C) are in contact therewith. By means of clock mechanism F, a spindle is adapted to be maintained in steady rotation—the urging main-spring being arranged to be intermittently wound by a key inserted on the square end of the spindle. On the spindle a graduated disc G is mounted, the boss of which is clamped to the spindle, in any position, by set-screws.

The disc G and lever B are so proportioned and relatively situated that, by the force of a spring, the extremity of the lever B is pressed against the periphery of the disc G, and thereby the gas-tap is normally retained in the open position. Also the ends of the lever E are at the same time maintained in contact with the springs and the leads D electrically connected.

A portion lying between the points of the periphery of the disc G is cut away sufficiently to release the extremity of the lever B, when the disc G is revolved into the position shown in the plan, and permit the spring to rotate the levers B and E into the positions shown in dotted lines, thus closing the gas-tap and breaking the electrical connection between the leads D.



Broucher's Automatic Gas-Supply Regulator.

To set the contrivance in position to perform its desired function, the clock spring is wound and the disc G is rotated into such a position that the extremity of the lever B points at such a graduated mark on its periphery that the interval between it and the release position corresponds to the time interval which it is required should elapse before the supply of gas is intercepted. In this position the disc G is secured to the clock spindle by clamping screws. After the lapse of the allotted time interval, the disc G will have been rotated by the clock movement into the position shown in the plan, in which the extremity of the lever B is in coincidence with the release point of the disc. At this instant the spring will force the lever B into the dotted position, and the gas-tap will be instantly closed and the electrical circuit broken.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Nov. 21.]

Nos. 16,543—16,980.

BAKER, H.—"Recovery and utilization of the cyanides contained in bye-products obtained in gas, &c., works." No. 16,879.
BATES, W. R.—"Vertical retorts." No. 16,951.
BIRCH, F.—"Control of compressed gas for internal-combustion engines." No. 16,872.
BRIGGS, T. F.—"Receptacles for storage of gas." Nos. 16,673 and 16,778.
Buchanan, H.—"Concrete, &c., pipes, and means for joining them together." No. 16,745.
COPP, H. E.—"Gas lighting and extinguishing controller." No. 16,777.
Crisfield, J. A. P.—"Gas-washer-scrubbers." No. 16,744.
EARNSHAW, C.—"Collapsible top for gas-container carrier." No. 16,949.
FOX, C. J.—"Generation and supply of gas to internal-combustion engines." No. 16,818.
GIBSON, T. B.—"Mechanically-operated pump for compression of gas used in vehicles." No. 16,611.
HALL, I.—"Gas and liquid-fuel burners." No. 16,684.
HAMBLET, J.—"Production of hydrocarbon gas." No. 16,934.
HOWORTH, F. W.—See *Buchanan*. No. 16,745.
IONIDES, A. C.—"Gaseous combustion." No. 16,806.
IONIDES, A. C.—"Melting-furnaces." No. 16,807.
JACKSON, A.—See Earnshaw. No. 16,949.
JACOBY, A. H. M.—See Fox. No. 16,818.
M'CUNE, R.—"Automatically reducing pressure of gas to internal-combustion engines, &c." No. 16,686.
Moir, D.—See *Buchanan*. No. 16,745.
MORRIS, W.—See Hamblet. No. 16,934.
MURPHY, S. J.—"Converting engine into coal-gas compressor, &c." No. 16,743.
PAPINEAU, R. W.—"Supplying gas to internal-combustion engines, and preparing gas therefor." No. 16,784.
SMITH, J. B.—"Gas-container for internal-combustion engines." No. 16,882.
STEWART, J. C.—See M'Cune. No. 16,686.
THORP, F.—See Copp. No. 16,777.
THUMAN, F.—See *Crisfield*. No. 16,744.
WALKER, H. R. L.—See Bates. No. 16,951.
WIGAN MOTOR BODIES, LTD., and WILLIAMSON, W. D.—"Control of low-pressure gas for automobiles." No. 16,960.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Lighting in the West of England.

Mr. CAREW asked the Home Secretary whether some modification of the Lighting Order was possible as regards inland towns in the West of England, so as to allow of the better lighting of the streets during the winter months.

Sir G. CAVE, in replying, said the chief officer of police was authorized under the present Order to give permission for the use of a reasonable amount of street lighting in inland towns in the West of England, provided that all lamps in use could be extinguished with sufficient promptitude on receipt of warning of the approach of hostile aircraft. No amendment of the Order appeared to be required. He understood that steps were being taken to improve the lighting of Tiverton.

NOTICES GIVEN FOR BILLS (SESSION 1918) RELATING TO GAS SUPPLY.

Aldershot Gas, &c., Company.—The Aldershot Gas, Water, and District Lighting Company will seek an extension of the areas of supply of gas and electricity. They will ask for authority to charge differential prices; to use certain lands for manufacture, storage, &c.; in regard to stand-pipes, &c., for the supply of gas to vehicles; to hold annual instead of half-yearly ordinary meetings; and to appoint Managing-Directors. There will also be provisions relating to capital.

Brentford Gas Company.—Power to purchase further lands, and to raise additional capital, will be sought by the Brentford Gas Company, who will also seek the repeal, alteration, or amendment (for the duration of the war, and for such further period, if any, as may be prescribed by the Bill) of provisions of Acts and Orders with respect to the supply of gas, the sliding-scale of price and dividend, and standard price and the standard rate of dividend, and (or) prescribing a minimum rate of dividend.

British Gas Light Company (Norwich).—Notice is given by the British Gas Light Company, Ltd., of their intention to promote a Bill to empower them to spend further capital on their Norwich undertaking; to use certain lands for gas-works purposes and the treatment of residuals; to charge as part of their expenses of the management of the Norwich station such proportion of the expenses at the Chief Office of the Company in London as may be prescribed; to enable them to furnish gas in bulk; to extend the limits of supply; and to declare that nothing in the Companies' Acts of 1858-1903 shall be deemed to require the Company to hold half-yearly meetings.

Cardiff Gas Company.—Power will be sought by the Cardiff Gas Light and Coke Company, upon such terms and conditions, and for such period as may be prescribed, to increase the present maximum prices of gas, and the charges agreed to with the Corporation for public lighting; to increase the rates of interest and dividend payable; and to extend the limits of supply.

Chepstow Gas Company.—The Chepstow Gas and Coke Consumers' Company desire power to acquire further land and to build new works; to extend their limits of supply; to replace the illuminating standard by a calorific power standard; to raise additional capital; to supply gas in bulk; and to adopt the co-partnership system.

Commercial Gas Company.—Additional capital and borrowing powers will be asked for by the Commercial Gas Company. The Company also desire to provide for the holding of the ordinary meetings annually instead of half yearly; and to repeal, alter, or amend, either temporarily for such period as may be prescribed by the Bill or otherwise, provisions with respect to the sliding-scale of price and dividend, and the standard price and standard rate of dividend, and to make new or substituted provisions; and, in addition to, or in lieu thereof, to authorize the payment of minimum dividends.

Gas Light and Coke Company.—A Bill will be promoted by the Gas Light and Coke Company to repeal, alter, or amend, either temporarily for such period as may be prescribed by the Bill or otherwise, provisions with respect to the sliding-scale of price and dividend, and the standard price and standard rate of dividend, and to make new or substituted provisions; and, in addition to, or in lieu thereof, to authorize the payment of minimum dividends. Other clauses will deal with the redemption fund, and the issue of debenture stock.

Hampton Court Gas Company.—The Hampton Court Gas Company desire the variation of the standard price of gas supplied by them, and the neutral zone in the sliding-scale, either temporarily or permanently, and the variation of the charges leviable for the supply of gas; the repeal, alteration, or suspension of the sliding-scale; authority to enter into agreements with bodies or persons carrying on an electrical undertaking, and with respect to any works for generating electricity established by the Company, for the supply of electrical energy in bulk or otherwise, or of heat or power, the provision of funds, and the allocation between the parties of working expenses, revenue, or profits; to make provisions with reference to the supply of gas for use in connection with mechanically propelled vehicles, and to provide, if thought fit, that the price charged for gas so supplied shall not be taken into account for the purposes of the sliding-scale. The Company wish for power to hold meetings annually, instead of half yearly.

Liverpool Gas Company.—The Liverpool Gas Company desire the varying of the standard price for gas, and the neutral zone in the sliding-scale applicable to them, either temporarily or permanently,

and upon such terms and conditions as may be prescribed, and to increase or otherwise alter the rents and charges leviable by the Company for the supply of gas; to make further provision, either temporarily or permanently, as to the dividends payable by the Company, and repeal or alter the incidence of the sliding-scale and neutral done; and to raise redeemable capital.

Maidenhead Gas Company.—A Bill will be promoted by the Maidenhead Gas Company to enable them to erect new gas-works; to raise additional capital; to amend and vary the provisions as to standard price of gas and standard rates and sliding-scale of dividends; to provide, maintain, and use barges, &c., in connection with the undertaking; and to put in force a co-partnership scheme.

Maidstone Gas Company.—Notice is given by the Maidstone Gas Company, on the same lines as other undertakings, of their intention to apply for an Act for the alteration of provisions as to dividend, standard price, and sliding-scale.

Newcastle-upon-Tyne Gas Company.—Notice is given by the Newcastle-upon-Tyne and Gateshead Gas Company that application is intended to be made by them for leave to bring in a Bill to repeal, alter, or amend existing provisions with respect to the dividend payable on their ordinary stock, to the maximum price chargeable for gas, and to the price for gas below which a dividend is payable at a rate exceeding the standard; and to make new or substituted provisions in lieu thereof. The Bill will or may (in so far as may be deemed necessary or expedient) increase the rates of dividend now authorized to be paid on the ordinary stock, and increase such maximum price and increase such standard rate of dividend, and increase the price now prescribed as the price for gas below which dividends may be paid at a rate exceeding the said standard rate. It will also authorize the payment of dividends upon the ordinary stock at such minimum rate as may be specified.

Plymouth and Stonehouse Gas Company.—The Plymouth and Stonehouse Gas Light and Coke Company give notice of a Bill to alter the provisions as to dividend, standard price, and sliding-scale; and to fix a minimum rate of dividend for the ordinary stock.

Pontypool Gas and Water Company.—There are four clauses which relate specifically to gas in a long notice given by the Pontypool Gas and Water Company. These have regard to the fixing of a calorific power standard; the laying of pipes for procuring or disposing of oil and other material and residual products, or for any purposes connected with the business; and to alter the powers of the Company with regard to the purchase of residual products and of materials required for working-up such products. There are financial provisions (including the keeping of separate accounts for the gas, water, and electricity undertakings); and the Company desire to change their name.

Portsea Island Gas Light Company.—Revision of the existing provisions with regard to dividend, standard price, and sliding-scale is sought by the Portsea Island Gas Company. There are various capital provisions, including power to issue redeemable preference stock or debenture stock; and the Company will ask for authority to set aside out of revenue, either in any one year or from time to time, and to replace to the credit of the reserve fund of the Company to such extent as may be defined in the Bill, moneys which have, since the outbreak of the present war, been, or may hereafter during the continuance of the war be, drawn from that fund for the purpose of making-up deficiencies attributable to the war in the amount of revenue available for payment of dividends on the ordinary stock of the Company at the rates authorized by the sliding-scale of price and dividend applicable to the Company.

Richmond Gas Company.—It is desired by the Richmond Gas Company to have power to increase the dividend payable upon the consolidated ordinary stock, for such period and to such extent as may be prescribed, without regard to the price charged for gas, and to make such other financial provisions as the Bill may provide for the relief of the Company during the period of enhanced cost of production arising out of the war. Further capital powers will be asked for, including redeemable preference and debenture stock.

Rotherham Corporation.—In a Bill of which the Rotherham Corporation give notice various matters are dealt with. One clause is to empower the Corporation and any company formed, or to be formed, for the purpose of producing gas and (or) extracting residuals from coal, to enter into agreements for the supply to the Corporation of gas, and to authorize the Corporation to supply such gas and wholly or partially to discontinue their gas-works. Another is to authorize the Corporation to purchase and supply coke-oven gas and heat; and a third, to enable the Corporation to supply or purchase gas in bulk, whether within or beyond their gas limits.

South Metropolitan Gas Company.—The South Metropolitan Gas Company wish for additional capital and borrowing powers; and to repeal, alter, or amend, for the duration of the war and for such further period (if any) as may be prescribed by the Bill, provisions with respect to the sliding-scale of price and dividend, and the standard price and the standard rate of dividend, and to make new or substituted provisions; and, either in addition to, or in lieu thereof, to provide for the payment of minimum dividends. The Company will also seek power to establish jointly with others any works or undertaking for the manufacture, working-up, &c., of products and of things used in connection with the undertaking.

South Shields Gas Company.—Notice is given by the South Shields Gas Company of a Bill to extend their limits of supply; to set up a calorific standard; to acquire and use certain lands for gas manufacture and the treatment of residual products; to authorize the Company to purchase and work-up and dispose of residual products from other gas undertakings, or other bodies or persons; to purchase gas in bulk; to make provisions with reference to the supply by the Company of power gas or non-illuminating gas, at special charges; to provide that any such gas may be used for illuminating purposes by means of incandescent burners; to provide that any price charged for such gas shall not be taken into account for the purposes of the sliding-scale of price and dividend applicable to the Company; to raise additional capital, including redeemable preference and debenture stock; to vary the sliding-scale of price and dividend and the standard price and the standard rate of dividend; and to increase rates of dividend and interest on preference and debenture stock.

South Suburban Gas Company.—The South Suburban Gas Company give notice of their intention to promote a Bill for the transfer to them of the undertaking of the Dartford Gas Company, and for the extension of the limits of supply. They will ask for authority to manufacture and supply gas for non-illuminating purposes; to make provisions with reference to the supply of gas for motor vehicles; to hold the ordinary meetings annually instead of half yearly; and to apply the reserve fund to payment of dividend. The Bill will contain a number of financial clauses—including the repeal, alteration, or amendment of the sliding-scale of price and dividend, &c., as already mentioned in the case of other companies. There is to be also provision for agreements extending the calorific power regulations to districts in which they are not now applicable. The references in the notice as to the supply of non-illuminating gas are as follows: "To authorize the Company to manufacture and supply gas for non-illuminating purposes, and in connection therewith to use their existing works and any works to be acquired by or transferred to the Company under or by virtue of the intended Act, or to erect, lay down, provide, and maintain new and additional gas-works, mains, pipes, and other works and apparatus, and also to buy or hire and to supply, sell, or let meters, burners, tubes, stoves, ranges, fittings, engines, machines, and other things for heating, cooking, or incandescent lighting by means of such gas, and also engines and machines for domestic, agricultural, manufacturing, industrial, or any other purpose whatsoever, and any materials or fittings to be used in connection therewith, and to make provision for the charges for gas for non-illuminating purposes, and for such meters, burners, tubes, stoves, ranges, fittings, engines, machines, or other things so supplied. To extend and apply to all or any such meters, burners, tubes, stoves, ranges, fittings, engines, machinery, and things the provisions of the Acts of or relating to the Company with respect to exemption from distress and having the effect of preventing fittings in which the Company retain any interest though affixed to the freehold of any premises becoming the property of the owner of such premises. To make applicable to the supply of gas for non-illuminating purposes the provisions of the Acts of or relating to the Company, and the Acts incorporated therewith, relating to the breaking-up of streets and the laying of mains and pipes. The Bill will or may confer such powers as aforesaid with reference to the manufacture and supply of gas for non-illuminating purposes, by amending or extending the provisions of the South Suburban Gas Act, 1912, relating to the supply of power gas, so that such power gas may be supplied for all or any of the purposes aforesaid, instead of for utilization for power only, and will repeal, alter or amend such of the provisions of the Act of 1912 or any other enactment as would prevent or interfere with the supply or utilization of power gas for illuminating purposes by means of incandescent burners." The Bill will amend any provisions which would prevent or interfere with the supply or utilization of power gas for illuminating purposes by means of incandescent burners. The Company will also ask for power to enter into agreements with anyone carrying on an electrical undertaking, and with respect to any works for generating electricity established by the Company, for the supply by either party to the other of electrical energy in bulk or otherwise or of heat or power, and the provision by either party of capital, and the allocation of working expenses, revenue, or profits.

Swansea Gas Company.—In their notice, the Swansea Gas Light Company state that they will promote a Bill to empower them, upon such terms and conditions, and for such period as may be prescribed, to increase the maximum prices of gas; to authorize them to pay increased dividends upon their consolidated stock and additional capital; and to amend existing conditions as to raising and issuing capital.

Tynemouth Gas Company.—Power is to be asked by the Tynemouth Gas Company, upon such terms and conditions and for such period as may be prescribed, to increase the maximum price of gas now fixed by their Act of 1904. Also the amendment of existing provisions as to raising and issuing capital.

Wandsworth, Wimbledon, &c., Gas Company.—The compulsory purchase of certain lands is desired by the Wandsworth, Wimbledon, and Epsom District Gas Company, as well as further capital and borrowing powers. There will be clauses in the Bill relating to gas-engines and apparatus let on hire, the cutting-off of supplies, the purchase and working-up of residual products from other gas undertakings, and the varying of prices charged for gas according to the purposes for which it is used.

Yeadon and Guiseley Gas Company.—An alteration of the standard price of gas is to be asked for by the Yeadon and Guiseley Gas Light and Coke Company, and the repeal, alteration, or suspension of the sliding-scale.

York Gas Company.—A Bill is to be promoted by the York Gas Company to alter the provisions as to dividend, standard price, and sliding-scale, and to fix a minimum rate of dividend for the ordinary stock.

Companies Seeking Financial Relief.

It will be seen from the above that, so far as has been gathered from the "Gazette" notices which have already appeared, the companies intending to seek financial relief in the coming session of Parliament are: Brentford, Cardiff, Commercial, Gas Light and Coke, Hampton Court, Liverpool, Maidenhead, Maidstone, Newcastle-upon-Tyne, Plymouth, Portsea Island, Richmond, South Metropolitan, South Shields, South Suburban, Swansea, Tynemouth, York, Yeadon and Guiseley, and Garw and Ogmore (Provisional Order).

PROVISIONAL ORDER APPLICATIONS.

British Gas Light Company (Trowbridge).—Notice is given that the British Gas Light Company, Ltd., intend to apply to the Board of Trade for a Provisional Order to define and regulate the capital expended in connection with the Company's Trowbridge station, and to provide for the investment by the Company of additional capital therein.

Garw and Ogmore Gas Company.—It is the intention of the Garw and Ogmore Gas Company to apply to the Board of Trade for a Provisional Order to authorize them to make a higher charge for gas than that prescribed by their Act of 1908; to fix a new and, if necessary, higher standard price for gas (varying if thought fit according to the price of coal), and to make provision for the fixing of dividends in accordance with the price charged for gas.

Hoylake and West Kirby Gas Company.—A Board of Trade Provisional Order will be sought by the Hoylake and West Kirby Gas and Water Company, Ltd., to (among other purposes) allow of an alteration in the limits of the Company for the supply of gas.

Sheffield Gas Company.—The Sheffield Gas Company will apply for a Provisional Order to authorize them to acquire certain lands, and construct thereon new works; to make further provision with reference to the supply by the Company within and beyond their limits of gas produced from coke-ovens, and to extend and amend the provisions of the Act of 1917 in regard thereto; and to authorize the Company to supply coke-oven gas for lighting purposes, and the use for such purposes of coke-oven gas so supplied, subject to such provisions as may be prescribed.

Effect of the Coal Scheme at Matlock Bath.

The Matlock Bath District Council have considered a recommendation that the price of gas be increased to 4s. per 1000 c.ft. The Chairman (Mr. G. H. Key) explained that the Council had previously used Yorkshire coal, but had now been compelled by the Government to substitute for it another kind which had involved a loss to the undertaking of £1000 a year. Mr. Lymn asked if the increased cost of the gas was due to the coal alone. The Chairman said that from the Yorkshire coal they formerly used there was produced 14,000 c.ft. of gas per ton; while the present coal only yielded 10,500 c.ft. In addition, there was an extra charge of 2s. 6d. per ton; and the use of the new coal involved more labour. Mr. Lymn said if there was a loss of £1000 a year to the gas undertaking owing to the alteration in the quality of the coal, he thought the Council should approach the Coal Control Committee asking them to allow a reversion to the old kind of coal. The Chairman said this had been done; but no reply had been received from the Coal Committee. The recommendation to advance the price of gas was agreed to.

Future of Industrial Energy.

Prof. F. W. Burstall, M.Sc., Chance Professor of Engineering in the University of Birmingham, discussing in the local Press of the city the problem of the future of industrial energy, points out that, so far, no serious attempt has been made to supply bulk power to industry on any large scale. The best example was the South Staffordshire Mond Gas Company, where an attempt had been made to supply at very cheap rates a low-grade gas suitable only for furnace and power purposes. The best utilization of coal would only be obtained when the production and sale of coal was carried on under restriction—that was, when the use of coal when it was delivered to the user was strictly laid down. The best method for the treatment of coal would be to establish close to the pit-head a carbonizing station, where the coal would be treated by heat to produce a certain quantity of tar, gas, and sulphate of ammonia. After treatment, the coal, or semi-coal, would be a smokeless material, and suitable for the majority of manufacturing operations and for domestic purposes. The gas would naturally have to be transmitted in pipes to the towns—which was an economical method, provided the distance did not exceed 30 miles—or it might be more convenient to convert the gas into electricity and transmit to the towns for distribution.

Colonial Gas Association, Ltd.

The Directors' report for the year ended June 30 to be submitted at the twenty-ninth annual general meeting on Tuesday next states that the sales of gas amounted to 16·44 p.ct. more than those for the previous year. By a recent award of the Court of Arbitration for Victoria, the wages of gas workers have been greatly increased; and there has also been a substantial advance in the cost of coal and all other materials. Consequently, it has become necessary to raise the price of gas at several of the Company's works. The special resolution increasing the number of preference shares from 30,000 to 50,000 and the dividend payable on such shares from 6 to 7 p.ct. as from Jan. 1 last (passed at the extraordinary general meeting held on Dec. 28) was confirmed at an extraordinary general meeting held on Jan. 15. The accounts show that, including the balance of £1878 brought forward from the previous year, and after providing for debenture and other interest, also renewals and depreciation, and deducting the dividend paid on the preference shares for the half year ended Dec. 31 last, there remains an amount available for distribution of £10,896. The Directors recommend dividends on the preference shares of 7 p.ct. per annum (less tax) for the half year ended June 30, payable in cash; and on the ordinary shares, 5 p.ct. per annum, tax free (equivalent to £6 1s. 3d. p.ct. less tax at 3s. 6d. in the pound, being British income-tax, after adjustment of the allowance in respect of Colonial income-tax) payable by the allotment of one preference share of £1 for every twenty ordinary shares, and fractions in cash. These payments will leave £2334 to be carried forward to next year's accounts.

MISCELLANEOUS NEWS.

CALORIFIC STANDARD FOR NEW YORK.

Optional for the Period of the War.

In a recent issue of the "JOURNAL," some notice was given of proceedings before the Public Service Commission (First District) of New York, with regard to a proposed change from an illuminating power standard of 22 candles for the gas supplied to a calorific power standard; and the issue last to hand of the American "Gas Age" states that, as a war measure, gas companies in the First District of the New York Public Service Commission may elect to operate under a heating standard for the duration of the war and three months after that time. The Order takes effect at once, and was made, at the request of the Federal Government, so that the companies could supply toluol for munition making. Our contemporary points out that companies may elect to operate on the heating standard by giving due notice in writing, and stating the time for which they desire the privilege. It was also finally settled that, if the companies desire an increase in gas rates, these increases can be granted only by resort to legal processes, because the Commission have no jurisdiction to consider rate increases. Gas-mantles, following the plan recently adopted in Chicago, are to be supplied by the companies free to consumers under certain conditions given in the Order. One of the interesting facts brought out by the hearings was that 80 p.ct. of the gas consumed in New York City is not used for lighting. The hearings were initiated by the Commission, and not by the companies, and were ostensibly for the purpose of considering the advisability of making the change in the heating standard and dropping a candle-power standard; but the hearing soon developed into a question of rates. As the Commission have no jurisdiction to permit an increase in rates beyond that allowed by the legislative Statute, the companies may have to supply more gas than 1000 c.ft. for 80 c. That is, if gas of a heating quality lower than the present 650 B.Th.U. requirement is furnished, the gas companies will have to pay a rebate to the consumers. The National Government are to use the conclusions in the report as the basis for negotiations and contracts with companies for toluol.

ESSENTIAL PARTS OF THE ORDER OF THE COMMISSION.

The War Department have communicated to the Commission that a public emergency exists requiring that the gas corporations subject to the jurisdiction of the Commission immediately enter into arrangements with the National Government upon suitable terms of compensation to begin the production, as soon as possible, of certain ingredients essential to the conduct of the war by the United States, which can be more effectively recovered from gas manufactured by the corporations under a heating power standard than from gas manufactured under an illuminating power standard, and requesting the Commission to fix a heating standard for gas manufactured, distributed, or sold by gas corporations subject to the jurisdiction of the Commission. The Commission have made investigation, and are of the opinion that a public emergency exists, rendering it necessary that in the conduct of the war gas corporations manufacturing gas shall produce certain ingredients which can be produced advantageously under a heating value standard, and that it is just, reasonable, and proper to fix standards for the measurement of the heating power of gas to which gas corporations shall conform at their election as an alternative to the illuminating standard now fixed by Statute, for the period during which the United States may be engaged in the present war.

1.—The Commission hereby fix a monthly average total heating power of not less than 650 B.Th.U. per cubic foot as a standard for its measurement of the heating power and thereby the quality of gas manufactured, distributed, or sold by gas corporations subject to the jurisdiction of the Commission, and furnished to consumers at a price not in excess of that now fixed by law or by any Order of the Commission. Provided, however, that such heating power standard shall not be, and is not intended to be, in derogation or a repeal of any other standard for the measurement of the quality of gas now fixed by Statute, but shall be a standard to which gas shall conform as an alternative, under the election herein provided, to that fixed by Statute. The average total heating power, for any three consecutive days in any calendar month, shall not be less than 615 B.Th.U. per cubic foot at standard temperature and pressure.

2.—That the gas manufactured, distributed, or sold by gas corporations shall conform to the standard of quality prescribed by any Statute now in effect, or, in the alternative, for a period not longer than until three months after the termination of the war in which the United States is engaged.

3.—That any gas corporation may exercise the option to furnish gas in conformity with the heating standard fixed in this Order, by filing with the Commission a statement in writing.

The rate to be charged or received per 1000 c.ft. for gas manufactured, furnished, or sold within the City of New York under the heating standard herein prescribed shall not exceed the sum of 80 c., or, where such person or corporation is authorized by law or by any Order of the Commission to charge a higher rate, shall not exceed such lawful rate.

In the event of such gas corporation proposing to furnish gas of a heating quality less than 650 B.Th.U. monthly average total heating power per cubic foot, and notifying the Commission in writing of their intention so to do, and of the minimum monthly average total heating power for such gas, the rate to be charged or received per 1000 c.ft. for such gas within the City of New York shall not exceed the rate which such person or corporation is now authorized to receive and collect by law or by Order of the Commission for gas furnished in the City of New York, less a percentage (not including fractions of 1 p.ct.) equal to the percentage by which the number of B.Th.U. monthly average total heating power per cubic foot of the heating power elected shall be less than 650 B.Th.U.

Such gas corporation will, upon the application of any consumer who at the time this provision becomes effective obtains illumination exclusively from open-flame burners, provide and instal upon such consumer's premises, free of any charge, one efficient incandescent lamp complete with mantle, of a type to be certified by the Chief Gas Engineer of the Commission, for each room, but not more than two rooms, occupied by such consumer. Provided, however, that such gas corporation shall not be required to replace, renew, or repair any mantle burner so furnished free of charge.

Consolidated Gas Company's Petition.

Mr. G. B. Cortelyou, the President of the Consolidated Gas Company of New York, has addressed a petition to the Commission asking for a re-hearing, so that the Company may have the right to introduce any evidence they desire pertinent to the issues.

The petition points out that the Commission's Order is based on a tabulation of gas tests from Jan. 1 to Aug. 31, 1917, and that this tabulation is insufficient, because the tests were made under abnormal conditions resulting from the exposure of gas-mains in New York City during the construction of the subways. Also that the tabulation proved the testimony of witnesses at the hearings that there is no established relation between the candle power of commercial gas and the B.Th.U. contents of such gas.

It is claimed that the Commission, in making the Order, ignored the evidence to the effect that consumers now using open-flame burners would use mantle burners, and that this would result in a loss to the Company of 16 p.ct. of total gas sales, due to the higher efficiency of the mantles.

Mr. Cortelyou states that he has been advised that the acceptance by the Company of the Order would deprive them of the right to apply to the Courts for relief from the existing 80-c. rate, under which the Company are furnishing gas at considerably less than cost—the cost including interest on the investment.

He remarks that the average heat units established in various communities, where changes in standard have been made, does not exceed 600 B.Th.U., and that these standards were fixed, with two exceptions, without a change in price. In one of these exceptions, that of Chicago, while the Order went into effect but four months ago, the Company have recently been forced to suspend dividends; and their stock is now selling for only $43 a share, compared with $129 a year ago.

In conclusion, he urges that the Order be modified by omitting all reference to change in price, and that, if after a reasonable experience under the new standard the Commission shall have reason to believe that the change has resulted in any substantial advantage to the Company, at the expense of the consumers, the question of the justness and reasonableness of the price can then be taken up and determined.

FURTHER EVIDENCE AT THE HEARINGS.

In addition to evidence already referred to in the "JOURNAL," at one of the sittings of the Commission, Captain Oscar H. Fogg (who recently resigned his position as Engineer of Utilization with the Consolidated Gas Company to enter the United States Army service) stated that from numerous tests on gas-ranges, he was led to believe that, by using a gas of 585 B.Th.U. at the uniform pressure at which such a gas could be supplied, and as compared with the results obtained at 660 B.Th.U., it is possible to obtain 67 p.ct. thermal efficiency in the utilization. This is considered high efficiency, as many of the gases now supplied in different parts of the country are only giving from as low as 35 to 58 p.ct. thermal efficiency at the burners of the modern ranges.

Colonel Dykman, of the Brooklyn Union Gas Company, when asked whether, if there is any reduced cost in the production of the gas, the Company would rébate that cost to the consumer, replied that the consumer would suffer nothing from the change, and that the Government would be the great gainer. The Gas Company would not be the gainer at all.

Mr. R. ffrench Pierce, of the Welsbach Company, stated that he had made many tests of the 22-c.p. gas, and gas containing approximately 585 B.Th.U. It had been found that greater luminosity had been obtained by mantles from gas of 585 B.Th.U. than from gas of 22-c.p.

Mr. R. A. Carter, a Vice-President of the Consolidated Gas Company, declared that they were anxious to do, and were already doing, all they could for the Government; and he brought out the main points subsequently emphasized in the petition above alluded to.

Mr. W. R. Addicks, also a Vice-President of the Consolidated Company, said he would be glad to see a heat unit standard; but it was in the interest of the consumer as well as of the Company—and not to the interest of the Company alone.

CONGDON STAND-PIPE ARRANGEMENTS.

In the "JOURNAL" for Oct. 24 last year [pp. 177-179], there appeared an illustrated description, forwarded by Mr. R. S. Congdon (the Manager of the Atlanta, Georgia, Gas Light Company), of his stand-pipe and valve arrangements for retort-settings. The pages of the American "Gas Age" now record the fact that a case of alleged infringement of patents has been heard in the United States Courts; the plaintiffs being the Riter-Conley Manufacturing Company, and the defendants the Atlanta Gas Light Company and Mr. Congdon. Our contemporary's report of the matter is in the following terms:

The United States Circuit Court of Appeals, Fifth Circuit, has just affirmed the decision of the District Court of the United States for the Northern District of Georgia, holding that R. C. Congdon and the Atlanta Gas Light Company have not infringed patents of the Riter-Conley Manufacturing Company. The valve patent of the latter Company was not declared to be invalid; but Mr. Congdon's valve patent was held not to be an infringement. Mr. Congdon's apparatus is covered by two patents. The first covers apparatus for the use of water, and the second is the valve patent which covers the combination of a valve inside the stand-pipe and means for passing water down and gas up the pipe.

The concurring opinion of Circuit Judge Batts, after a statement of the facts, follows: In coal-gas making, by connecting a stand-pipe between two vertical rows of horizontal retorts with each retort (patent No. 1,091,111) by a lateral pipe with a valve in the retort (patent No. 1,122,683), and (patent No. 1,140,113) charging the retorts at such intervals as maintained in each a degree of carbonization different from the others, complainants claim to have accomplished ease in removing lampblack from the connecting-pipe, and an equality of temperature, obviating the deposit of tar, lampblack, and pitch, removal of which under the old system of retorts with separate stand-pipes was troublesome and expensive.

Defendant is charged with infringement in the operation of a plant with like rows of retorts connected on one side of a stand-pipe by a pipe and a valve in the stand-pipe, in which water is kept flowing down the interior of its sides; the charging being sequently done with a machine which is moved at regular intervals from one to another of the horizontal rows into which retorts of the vertical rows of corresponding height are disposed. It was claimed that the water-jacket obviated the deposit, and that the location of the valve in the stand-pipe rendered cleaning the connecting-pipe easier.

The use of a single stand-pipe for several retorts, if ever patentable, was anticipated by United States patents: Rowland, No. 211,591; Fowler, No. 808,831; Taussig, No. 694,443; and English patents: Wates, No. 5513; Hanson, No. 8880; and Scoble, No. 421. The use of a lateral pipe and valve to connect the retort and stand-pipe involved nothing novel, and was anticipated by patents: Rowland, No. 211,591; and Wates, No. 5513. Regulating intervals between chargings of retorts would not seem to be more patentable than a schedule for trains, or meals, or medicine. The method was anticipated by Slade, No. 4422. If the patent were valid, it was not infringed. At most, it involved a method by which stand-pipe stoppage was reduced, if conditions (including an enlarged pipe) were as at complainants' plant. Defendant continued, after patent, a manner in substantial accord with complainants' method of using a charging machine. The manner of use was customary, and not to produce results claimed by the patentees. The essential conditions were evidently absent, for the results did not follow.

POOR GAS IN THE TOTTENHAM AREA.

Company Blame the Local Authority.

For some weeks the gas supply, both as regards quantity and quality, in the large area covered by the Tottenham District Light, Heat, and Power Company has, as stated in last week's "JOURNAL," been unsatisfactory; and the causes are explained in correspondence which has ensued between the Tottenham Urban District Council and the Company.

This was made public at a meeting of the Council last Tuesday. The Clerk reported that on Nov. 13 he wrote to the Company stating that considerable inconvenience had been caused to residents in the neighbourhood; and the low pressure, which had been revealed by the Gas Examiner's report, coupled with the great fall in the calorific power, had caused widespread discontent. He requested that the Company would immediately give the Council a definite assurance that without delay steps would be taken to remedy this unsatisfactory state of affairs.

The Secretary of the Company (Mr. E. J. K. Fussell) replied that they had spent approximately £250,000 on a new section of plant, which, but for the war, would have been finished in September, 1915. The war had prevented the work being started with this section until now; and there had been difficulty because of the scarcity and independence of labour. In the meantime, the old plant, which was taxed almost to its utmost limit before the war, had had to carry the increased load without being able to receive the necessary repairs and attention, because of the impossibility of obtaining materials or retaining labour. One mistake the Company made early in the war was to go out of their way to induce their workpeople to join the army. The substituted men and women were not so expert in the work, nor had they the same interest in the Company as the regular employees. Added to this, there had been a constant demand for their fit men for the army, and a constant inducement for others to leave the Company's service for munition work. Under these conditions, breakdowns had become frequent at the works; and the present state of affairs was the result. He might also venture to remind the Council that the Company foresaw the possibility of this in April, 1916, and then arranged to spend nearly £4000 to improve the supply, and sought the Council's co-operation, by asking them to allow a pumping-station for the purpose to be placed on Page Green Common. Unfortunately, the Council could not see their way to do so, or a main would have been laid and the present serious position would have been avoided.

The Council denied the justice of the Company's endeavour to place responsibility on the shoulders of the Local Authority.

A discussion ensued; one member remarking that all gas companies were extracting some properties from the gas for the Government, but not to the extent the Tottenham Company were. The consumers were, in fact, paying for new milk and getting skimmed milk.

Asked if the Company were not under penalties to supply gas of a prescribed standard, the Clerk said he would look up the position.

The Harringay Ratepayers' Association were complaining of the gas, and stating that it was a common sight to see shopkeepers transacting their business by candle-light.

The Council decided to confer with the Company so as to go thoroughly into the whole matter.

Increased Price at Sligo.—The Sligo Gas Company have again increased the price of gas. In October, 1914, the charge was 4s. 2d. per 1000 c.ft. An increase of 5d. was afterwards imposed, and later a further 5d. was added; while the present increase is 1s. 3d.

ORIENTAL GAS COMPANY, LTD.

The Ordinary General Meeting of the Company was held last Wednesday, at the London Offices, Finsbury House, Blomfield Street, E.C.—Mr. H. D. ELLIS presiding.

The SECRETARY (Mr. S. Rainer) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

THE UNAVOIDABLE DIFFICULTIES OF WARTIME.

The CHAIRMAN, in moving the adoption of the report and accounts, said that in the first narrative paragraph of the former the Directors adverted briefly, and without bitterness, to the obstructions and restrictions which had beset their path during the past year in the prosecution of their commercial campaign. The Directors said the obstructions and restrictions were no less formidable than those of the preceding year. They might with truth have put it in very much stronger language; but they thought there was no need to paint matters in their most lurid colours. The fact was merely mentioned for the information of the shareholders. He would not stay to particularize now all these difficulties; but perhaps he might later on, as he progressed, have occasion to touch upon one or two of them in connection with the accounts. But he should like to say that they did not make any complaint. They knew that we were at war; they recognised that it was the bounden duty of the Governments—the Imperial Government here and the Government of India there—to neglect no scheme or expedient which might possibly be calculated to conserve, enhance, and improve the resources of the Empire to win the war. Although the Company had felt the strain considerably, they did not impugn the policy of the higher authorities; and they did not cast the slightest reflection upon the action of those officials who had been charged with the administration and the execution of that policy, and perhaps had their difficulties to deal with just the same as the Directors of the Company had theirs.

GOOD WORKING RESULTS.

Turning to the accounts, the first remark he had to make was that they reflected the highest credit upon their General Manager (Mr. L. M. Snelgrove). The proprietors knew very well, from what they had heard in the meeting room on former occasions, that Mr. Snelgrove was an excellent Engineer. His work had always been good; but it had been better than ever this year. In point of carbonization, he had made a larger quantity of gas per ton of coal treated than had ever been attained before. Beyond this, the quality of the gas was even higher than it was in the preceding year. The power of the gas, both illuminating and calorific, was greater, the specific gravity was lighter, while the purity in respect of ammonia and carbonic acid was better than had ever been reached previously. He might remind the proprietors that the gas was tested by the Corporation every day for power, pressure, and purity; and his statement was based upon the Corporation's own official returns.

THE ACCOUNTS EXAMINED.

Looking at the revenue account for the twelve months, the first item on the credit side was "Gas-rental, £62,878." As mentioned in the report, this was rather less than it was in 1916. He supposed people must be prepared for fluctuations in war time; and, for the matter of that, they need not be surprised if they had some fluctuations in peace time too. With regard to the decrease, the public authorities of Calcutta had been able to get along with rather less gas than they required in 1916; and so the cause of the reduction was to be found in the public lighting. But the general position of the public lighting was eminently satisfactory; and on June 30 the number of public lamps that the Company were supplying was 244 in excess of that at the corresponding date in 1916. Moreover, since the date of the accounts, they had made a contract with another of the suburban municipalities to supply their public lamps for a term of fifteen years. Therefore, he might say that the public lighting looked well for this year; and he hoped it would so prove when they met again next year. With regard to the private consumption, they had fixed a large number of new services, both for old consumers and for newcomers, for lighting, cooking, and heating domestically, as well as for various manufacturing and trade purposes. The next item was the residual products. Here again Mr. Snelgrove had surpassed all previous efforts by producing nearly 13 cwt. of coke per ton of coal carbonized; and this large output happily had been enhanced by a very good market for the commodity. Tar had been a little smaller, but at a higher price, which nearly equalized matters; and sulphate of ammonia, as to which he spoke hopefully this time last year, had realized their expectations, and had materially contributed to the revenue. There was one more item—fees for transfers and for probate registration—which was lower. Even here he should like to deduce some pleasant augury from the fewer transactions, which indicated that their stock was firmly held, as it should be, and from the paucity of probate fees as suggesting that the expectation of life of the happy Oriental gas shareholder was being extended. This made the income £89,137, or £6067 more than the corresponding figure for 1916. Turning to the other side of the account, he wished to correct a typographical error. The first item, coal, should read £27,297 and not £29,297. The corrected item was some £800 more than it was last year. The quantity of coal carbonized was rather less; but all charges had increased. It had cost more for purification, more for wages, and, with regard to coals, since last year an extra tax had been imposed—an internal tax of 4½d. per ton upon all coal in transit. This accounted for nearly £700 out of the excess of £800. The new tax he hoped was going to help to win the war; but it carried their expenditure up a little higher. Salaries in India and London were about £100 less. Indian income-tax showed an increase, arising from the higher rate. A year ago the Indian income-tax was equivalent to 6d. in the pound; but it had been put up now to 1s. 3d., which was a rise of 150 p.ct. There was one good thing to be added respecting this, that in paying the English income-tax, they were allowed a rebate of the 1s. 3d. paid in Calcutta. Mains, meters, and services were practically the same—within £100 or so. Wear and tear of works was about £1100 more. This, of course, required no explanation. It was notorious that materials and labour everywhere cost much more. Renewals suspense account, £5000, required some explanation. Owing to the obstructions and restrictions upon the export of material from this country, and the difficulty of getting permits for it to be landed in India, they had not been able to execute the works they would have done. They must not treat the £5000 as being profits which they could deal with as they pleased. The £5000 had not been expended; but it would be expended as soon as they were in a position to do so. When this would be, nobody knew; but in the meantime it was the policy of the Directors to set aside and earmark the amount to meet renewals which in happier times they would have made. Bad debts and allowances showed a reduction of £2786. It would be remembered that last year, the Directors wrote off a large batch of old arrears. Consequently, the item was reduced. General expenses were £160 more. This, of course, was influenced by the general rise. Superannuations were somewhat less. The result of it all was that they had a revenue balance of £26,076, which was about £874 more than they had this time last year. Looking at the balance-sheet, the exchange equalization account was £664 more. During the year there had been a great deal of speculation in silver; and the price of the metal had fluctuated wildly. The result of it, however, was that the exchange went very much in favour of the rupee; and consequently their remittances to this country had benefited accordingly. These little sugar plums were very nice when they had to pay so much more for everything else. The amount due to the Company was a constantly liquid and flowing one; and they had no long accounts running. The greater part of the amount was probably paid off in July. He must next refer to an item which was conspicuous by its absence. In 1916, they had loans from their bankers £12,500. This had disappeared; there was no loan due to the bank now. The debt had been paid off partly by increased profits, partly by the postponed expenditure on renewals, and partly by the sale of surplus land. This brought him to the other side of the account. The first item there was, "Sale of surplus land, £4107." Some years ago, the Company purchased a plot of land adjoining their works, which it was desirable to secure for improvements. But they did not at the time have to utilize the whole of it. The Government recently desired to acquire the balance of the land from the Company for the purpose of one of the State Railways. They put into action the Lands Acquisition Act; and, in accordance with this, the price of the land was settled. The money was paid, and had been credited to capital account. He was happy to say the price received recouped their expenditure. The amount due to the Company, £6742, was also a fluctuating one. In coals, products, and sundry stores, they took credit for an increased amount of nearly £1750. All these stores had been most strictly checked and valued; and they were fair and just as they stood in the balance-sheet. Cash in Calcutta and London was a little more—£1580.

CONDITION OF THE WORKS AND PLANT.

Coming now to the condition of the works, he thought that the proprietors would like to hear something about this. Mr. Snelgrove reported that all the mains and services had been maintained in good condition; but owing to the prevailing high cost of materials, as little mainlaying as possible had been done—the greater part of the expenditure having been in respect of repairs. A considerable portion of the mainlaying work had been executed in connection with, and to the instructions of, the Calcutta Improvement Trust, for which work they had received payment, and further extensions on a large scale were anticipated in the future. He (the Chairman) might remark that the Calcutta Improvement Trust was a most important body charged with the improvement of the thoroughfares and open spaces, and general conditions in Calcutta. He believed they had ample funds at their disposal; and he thought they might be relied upon to carry out their objects on a scale worthy of Calcutta. Such local improvements might fairly be expected to draw in their train an increased demand for gas. Mr. Snelgrove further said that all plant and machinery had been overhauled and maintained in good working order, making allowance for difficulties imposed by war conditions. It also appeared from his report that the same care which had been devoted to the plant and machinery had been given to the buildings, boundary walls, and other erections, and that the general condition of the works and plant might be summed up as good.

POPULARIZING GAS IN CALCUTTA.

It would interest the proprietors to hear how Mr. Snelgrove was working to popularize the use of gas for trade purposes, some of which means were novel in India, and indeed elsewhere perhaps. He said that during the past year one-half of the old mechanical shop had been converted into a demonstration room; and he had thus been able to show prospective customers what could be done in actual practice with various types of furnaces which had been sent out from England. He (the Chairman) was sure the proprietors would agree with him that it was sound policy to bring home to people by ocular demonstration how they might promote their own interests by the scientific use of gas, and not to leave them to find this out for themselves, which perhaps they might have done.

AN ARBITRATION AND THE RESULT.

There was only one other matter which he had to mention. Some of the proprietors might perchance have read in the Indian Press how a difference had arisen between the Corporation and the Company regarding the true construction of clauses in their contract for the public lighting, and that the question had gone to arbitration. He should like the proprietors to know that the Directors on their part used their utmost endeavours to arrive at an amicable arrangement of differences with the Corporation; but they were not so fortunate as to succeed in this aim. With the utmost regret they found themselves engaged in proceedings; but in self-defence they were bound to preserve, if they could, those rights which were essential to the effective discharge of their duties to Calcutta, which the Legislature had entrusted to the Company more than sixty years ago, and which it was their pride to have faithfully and successfully rendered ever since. The justice of

their claims had been vindicated by an award of the Arbitrators in favour of the Company.

Mr. ROBERT MILLER seconded the motion.

Mr. R. M. LONG remarked that in the report it was stated that certain extensions properly assignable to capital had been defrayed out of revenue. He inquired the amount that had been so spent.

The CHAIRMAN said the whole of the amount assignable to capital had been paid out of revenue. The amount was under £3000. This had been their policy ever since he had been upon the Board.

Mr. LONG said, had it not been for this, the profit for the year would have been much larger, and so there would have been a more favourable showing. He agreed that the policy was a sound one. Regarding the writing-off of bad debts last year, had it been possible to collect any part of the amount, or was it entirely bad?

The CHAIRMAN replied that only a very small proportion had come in. When they wrote-off bad debts, it was generally because they considered them hopeless.

The motion was unanimously carried.

Moved by the CHAIRMAN, and seconded by Mr. A. T. EASTMAN, a dividend was declared at the rate of 4½ p.ct. (less income-tax), making, with the interim dividend of 3½ p.ct. (less tax), a total of 8 p.ct. for the year.

The CHAIRMAN proposed the re-election of Messrs. R. Miller and Stanley H. Jones to their seats at the Board. They were, he remarked, most valued members. Mr. Miller had had an experience of a great many years in Calcutta; and Mr. Jones was the Engineer of one of the most important gas companies in the kingdom. He had gained wide experience there, which was placed at the disposal of the Board, and was of the highest value.

Mr. W. WILLIAMS seconded the proposition, which was heartily agreed to.

On the motion of Mr. J. MITCHELL, seconded by Mr. LONG, Messrs. S. W. Savage and Frederick Seel were re-appointed Auditors, at the same remuneration.

The CHAIRMAN, in proposing a vote of thanks to the chief officers and their staffs, said he felt that this was not a mere matter of form. It was a debt they owed to their officials. He had had occasion to mention Mr. Snelgrove several times in the course of his opening speech; but he must say further that Mr. Snelgrove had worked so hard for the Company that he (the Chairman) was sorry to say he became seriously run down. His doctor almost insisted that he should go up to Cashmere in order to recuperate. Mr. Snelgrove could not bring himself to go so far from Calcutta in case he was wanted. He went to Darjeeling; and the health-giving air of that place had done him a great deal of good. He (the Chairman) had just received a cable from him saying: "I am back in Calcutta, fit and well." The proprietors would express their thanks to him and his staff most emphatically. Their Manager had been well backed up by both the English and the Indian gentlemen of his staff. As to Mr. Rainer, he had now completed his first entire year's service as Secretary; and he (the Chairman) could say the Directors were entirely satisfied with the way in which he had discharged the duties of his office. He was a hard worker, and most attentive; and he had a complete grasp of everything connected with the office. His staff were also very efficient, and worked conscientiously and well.

Mr. STANLEY JONES, in seconding, said he could confirm all the Chairman had said as to Mr. Snelgrove and the staff in India, as well as of Mr. Rainer and the staff at home. The Company were thoroughly well served.

The motion was cordially passed.

Mr. RAINER acknowledged the vote on behalf of all concerned. He should in due course have much pleasure in conveying its terms to Mr. Snelgrove.

Proposed by Mr. SEEL, and seconded by Mr. MITCHELL, a hearty vote of thanks was passed to the Chairman and Directors, which was duly acknowledged by the former.

AN EDINBURGH GAS STRIKE AVERTED.

A mass meeting of the men employed by the Edinburgh and Leith Gas Commissioners was held on Sunday afternoon of last week. It had been arranged that the Lord Provost of Edinburgh and the Provost of Leith should address the meeting; and these gentlemen, with the Gas Engineer (Mr. Alexander Masterton) and the Clerk (Mr. J. M'G. Jack), duly made their appearance on the platform.

The LORD PROVOST, who met with a hearty reception, said it would be disastrous and discreditable to the city if at the present time any breach took place between a responsible body of employers and a responsible body of employees. It was highly desirable that no extreme action should be taken which could be avoided by mutual accommodation. He and his colleagues on the Gas Commission realized the difficulties of the working classes, on account of the high prices prevailing, and other circumstances. The employees were quite entitled to ask for reconsideration of the wages award made last July; and the Commissioners were prepared to agree to arbitration, and to take immediate steps to co-operate with the men's officials in having the wages question reconsidered by a Government-appointed Arbitrator. The Commissioners would heartily and loyally abide by the award. With a view to forwarding such arbitration proceedings, they had communicated with the Chief Industrial Commissioner, who had replied that the Department were in communication with the union officials regarding the appointment of an Arbitrator. He urged the men to accept the arbitration proposals, and continue at their work.

The PROVOST OF LEITH pointed out that a strike would not settle the question. Arbitration proceedings would have to be resorted to in

Gas Furnaces under Working Conditions

¶ The Davis Furnace Company have established at their Luton Works a completely equipped Exhibition Room for the practical demonstration of their various types of Gas-fired Furnaces (Town's Gas, High Pressure Gas, and Air Blast).

¶ Appointments to visit are cordially invited.

The Davis Furnace Company, Diamond Foundry, Luton

(Proprietors: The Davis Gas Stove Co., Ltd.)

any case; and he hoped a common-sense view of the situation would prevail.

Mr. TAYLOR (the General Secretary of the Union) stated that a telegram had been received from the Chief Industrial Commissioner's Department, intimating that the name of the Arbitrator would be sent that day. He also remarked that the occasion was unique in his experience of industrial matters, in that they had a Lord Provost and a Provost at a meeting of workers on the eve of a threatened strike.

After the visitors had withdrawn, a general discussion followed. The feeling was expressed by several speakers that, prior to this promise of immediate arbitration, there had been a disposition to delay the matter; and this had created suspicion.

On a show of hands, there was an overwhelming majority in favour of arbitration.

BARROW GAS DEPARTMENT ACCOUNTS.

The Borough Treasurer of Barrow-in-Furness (Mr. W. W. Waite) has issued his "Blue-Book" for 1916-17; and in dealing with the Gas Department, he says that during the three years ended March 31 last the income from the sale of gas, public lighting, residuals, and sundries, has been:

—	Sale of Gas.	Public Lighting.	Residuals.	Sundries.	Total.
	£	£	£	£	£
1914-15	46,248	3,029	9,631	692	59,600
1915-16	50,742	1,799	12,934	682	66,157
1916-17	57,309	510	15,631	1,370	74,820

The expenditure in respect of coal, oil, manufacture, maintenance of works, and interest and sinking fund charges for the last three years has been:

—	Coal and Oil, Manufacture and Maintenance.	Renewals.	Loan Charges.	Total Expenditure.
	£	£	£	£
1914-15 . .	46,029	4,041	8,295	58,365
1915-16 . .	55,623	4,269	8,573	68,465
1916-17 . .	63,204	4,269	12,580	80,053

The profit and loss for the three years is:

—	Gross.	Net Profit.	Net Loss.
	£	£	£
1914-15 . . .	9606	1235	..
1915-16 . . .	6400	..	2308
1916-17 . . .	6693	..	5234

The increased loss in 1916-17 has been brought about primarily by the advanced prices of raw materials—chiefly oil and coal. The delay in the completion of the Salthouse works has also contributed very largely. This is chiefly due to the loan charges, and also to the resultant continued strain upon the Hindpool Road plant, rendering it less efficient.

In the past year, the sum of £4296 has been expended from the renewal fund. This sum includes an item of £938 in respect of the balance of the contract for the coke-conveying plant. The amount in this fund is now £729, against £714 for the previous year. During the last ten years £42,183 has been expended from this fund in replacements and extensions at the works. The capital expenditure to date is £214,013, of which £25,084 has been expended during the past twelve months. The outstanding debt against the gas undertaking is £151,110. The particulars of consumers are: Ordinary meters, 3845; prepayment meters, 9295—total, 13,140.

Mr. Fred. Chadderton (the Engineer and Manager), in his report, gives statistics relating to the make of gas, and concludes: "Reviewing the year, it has been extremely difficult to maintain the supply, and it has only been possible by excessive overtime, both by the staff and workmen."

SOUTHPORT GAS-WORKS' REPORT.

Interviewed on the subject of the Southport Gas-Works' report for the year ended March 31, Mr. Richardson (the Chairman of the Gas Committee) said that, compared with former years, the results were very satisfactory. There was no undertaking of the Corporation that had been so hardly hit, and in so many directions; and it had only been by very strenuous economy that they had been able to come out as they had done.

A new tar-distilling plant had, he said, been erected, at a cost of £4000, out of revenue. Then they had the plant for the manufacture of liquid ammonia, which had cost £2000, and a new plant for debenzolizing. This latter was not a very costly affair, for which the ratepayers had to thank Mr. John Bond, the Engineer and Manager. It was his own idea, and at a greatly reduced cost was doing work

WAR WORK

Has had first place with us since 1914.

We appreciate, however, our customers' needs for "D.S.O." Fires and Gas Steam Radiators. In thanking our many clients for their orders, we would respectfully beg their indulgence if their exact requirements cannot be met at once, and we suggest to save delay that alternate sizes and finishes be accepted where possible.

R. & A. MAIN, LTD.

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

which in other places had entailed a larger outlay of money. This Southport plant had proved wonderfully successful, and since being erected at Southport had been copied in several other works, with equally good results.

Mr. Richardson was emphatic in stating that the vertical retorts were now working better than they had ever done. There had been rumours about that they were not doing what they were guaranteed to do; but, from tests made, it had been proved that they were doing all it was said they would do. There had been times when the make per ton had not been up to the standard guaranteed; but the reason for this was that the experiments were made with inferior coal and slack—material that at the time was not recommended. The retorts were satisfactory in the matter of labour saving.

As hinted in the report, Mr. Richardson said the price of gas to the consumer would inevitably rise, as at the present time the Committee were paying 2s. 6d. more per ton for coal. In addition, the cost of the increased war bonus (2s. 6d. per man per week) will have to be recovered from the consumers. Last year the Town Council took the sum of £6000; and if they took this or any other amount again, the ratepayers would know that it was not the Gas Committee who were responsible for the high charge. If all the coal now burnt in house fires were carbonized, the cost of gas could be brought down to such a low figure that it would be cheaper than coal-fires.

TROUBLE AT BINGLEY GAS-WORKS.

Matters connected with recent trouble at the gas-works were referred to at a meeting last week of the Bingley Urban District Council; an announcement being made of the reasons for the termination of the engagement of Mr. Julian Stephenson, jun., the Gas Engineer and Manager.

Mr. THOMAS TURNER (the Chairman of the Gas Committee), in moving the adoption of the Committee's minutes, said he wished to make a statement with reference to the recent trouble at the gas-works, so that certain rumours as to the Council's position might be set right. As the members of the Council were aware, the engagement of Mr. Stephenson, the late Engineer, had been terminated by the Council, owing to irregularities in connection with the slot-meter collections, and because of certain moneys from that source not being accounted for. The amount involved, so far as could be ascertained, was slightly in excess of £100; but the Council would not suffer from the irregularities, because Mr. Stephenson's friends had made up whatever deficiency had been ascertained.

Mr. T. SNOWDEN, during the meeting, proposed a motion, of which he had given notice, to the effect that Mr. Turner should be invited to resign his position, as a protest against his lack of confidence in not informing the members of the Committee and the Council for three months as to the irregularities of the Gas Manager.

The CLERK (Mr. A. Platts) said the responsibility for the matter to which Mr. Snowden was referring was shared by him with Mr. Turner; and any remarks that member made respecting the responsibility, applied to him (the speaker) just as much as to Mr. Turner. Whatever he had done, he did in the best interests of the District Council and the town of Bingley.

Mr. SNOWDEN strongly complained that the members of the Council and of the Gas Committee had not been informed earlier of what had been discovered at the gas-works. The fact that something was wrong, he said, was discovered when the Auditor of the Local Government Board was making the annual audit in August; and the late Gas Manager admitted that he had misappropriated public money. The Chairman of the Council, however, was not informed for some time of what had happened; and it was not until a short time before a special meeting of the Council on Nov. 8 that the members of the Committee and the Council as a whole knew that something was wrong. He commented on the fact that the Manager had been kept at his post—it was said to reveal details in connection with the matter—until the meeting of the Council, which followed upon a letter of Nov. 2 from the Local Government Board. At that meeting the members had no lead from Mr. Turner; and in the end the meeting resolved—without any member making a motion—to dispense with the services of the Manager and obtain a successor.

Mr. TURNER asked if there was no chance of reply for him.

The CHAIRMAN (Mr. B. Garnett) said as there was no seconder to the motion it fell to the ground, and could not be discussed.

RATIONING OF GAS IN AMSTERDAM.

Reference has already been made in the "JOURNAL" to the issue by the Dutch Coal Controller of rules relating to the rationing of gas in Holland.

The allowance for lighting, per meter (ordinary or prepayment) was: October, 565 c.ft.; November, 777 c.ft.; and December, 898 c.ft. Consumers having both gas and electricity services received no allowance for gas, and so had to use electricity exclusively. There was no allowance for gas cooking; but for water heating there was a ration of 353 c.ft. per meter. Furthermore, there was a fixed amount granted of 1050 c.ft. monthly for each gas-fire.

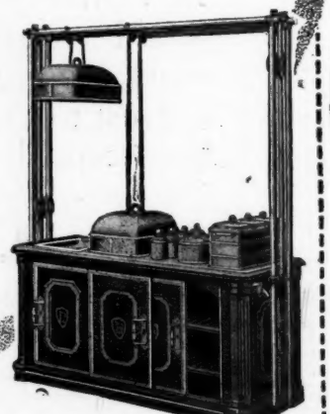
In many cases, this system has not had the results anticipated. Many consumers exceeded their limits, with the consequence that their gas supply was cut off for a period calculated on the quantity of gas consumed in excess of the ration. As such methods would prove too laborious for a place of the size of Amsterdam, another plan for economizing gas was devised.

During part of August and the whole of September, the pressure of

Works' Kitchens.

THE Industrial Canteen has proved itself a sound business method of increasing the efficiency, productivity, and good comradeship of the Workers; it is the only solution to the difficulty of obtaining adequate nourishment at a reasonable price, and the practice of installing suitable accommodation in or near the Works is still rapidly spreading.

"RICHMOND" Cooking, Water-Heating, and Food-Warming Equipment meets every requirement of the modern Canteen Kitchen, and is to-day rendering satisfactory service in hundreds of Munition Factories and General Manufacturing Businesses.



Our considerable experience is placed at your disposal to co-operate in providing equipment for large or small numbers of people.

THE RICHMOND
GAS STOVE & METER CO., LTD.
General Offices and Works - Academy Street, Warrington.
Offices - 132, Queen Victoria Street, London, E.C. 4.

the gas was lowered for some hours out of the 24, to such an extent that consumption through lighting, heating, and cooking burners was practically impossible. This was so successful that on week-days the consumption was reduced 30 p.ct., and on Sundays 45 p.ct.

In view of this, the authorities proposed the following system of rationing: Every consumer has an allowance of 60 p.ct. of the quantity of gas used in the corresponding months of 1915 and 1916. To facilitate economizing, the pressure of the gas is lowered below usable limits from 6.30 to 8 in the morning, and from 12 to 3 in the middle of the day, except on Saturday and Sunday, when the hours fixed are from 12 to 4 p.m.

GAS FOR MOTOR VEHICLES.

Writing in the "Glasgow Herald" on the subject of gas risks and insurance, Mr. A. Fraser Sinclair says: The use of coal gas as fuel has introduced various changes into motoring and its practices; and if it has not added anything in the way of risk to the vehicle on the road, the same can scarcely be said of the storing of cars in garages with collapsible gas-containers half-full of gas. These containers are known to be liable to leakage, due to perforation from friction; and already we have been assured that in the case of a garage on the ground floor of a tenement house there may well be danger of poisoning to the inhabitants of the dwelling-houses above. Under the circumstances, it might well be assumed that an added risk would arise for the insurance companies to claim additional premium upon. It would appear, however, that the companies are not at present inclined to move for the purpose of safeguarding their interests, from which it may be taken that the premiums are at a sufficiently exalted level to keep them secure. At the same time, it would be just as well for any owner who has insured on the understanding that liquid fuel would be used, to bring the change under the company's notice. An acknowledgement from them of the intimation would keep the insured safe. In addition to the vehicle, there is, of course, the danger to the garage from the storage of a highly inflammable gas in containers of a none too robust character. It could be held, of course, that gas could not well be considered more dangerous than petrol, and with that the ordinary man in the street would no doubt be prepared to agree. But, as it happens, the point in the event of fire or explosion is not one for the ordinary man to settle; and the best plan for the insured is to have the matter adjusted with the company taking the risk. By paying-up any extra premium demanded, any worry will be avoided.

There was a diverting scene at a busy hour of the day in Edinburgh on Monday of last week, in which a motor-bus gas-container figured. A high wind was blowing; and this caused a well-filled gas-bag to leave its proper place on the top of a bus, and begin an irresponsible exploration of Princes Street, with a number of men and boys giving chase. Having captured the runaway, they endeavoured to restore it to its proper position; but the wind and the bag's unwieldly bulk prevented this. Ultimately, as the bag, under the influence of an increasing wind, seemed disposed to soar heavenwards, the gas was let out, and the empty container stowed away in front of the bus, which then resumed its journey with petrol.

It has been decided at Haverhill to supply gas at the works to vehicles at a charge of 5d. per 100 c.ft. Motorists will be able to receive supplies during the whole 24 hours.

The Droitwich Gas Committee have decided upon a charge of 6d. per 100 c.ft., including attendance. The filling-station is at the gas-works.

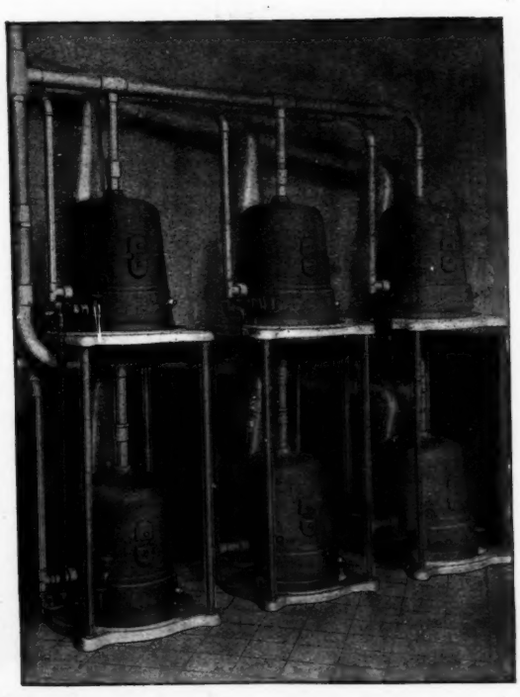
A correspondent of the "Commercial Motor," writing to the Board of Trade, in regard to the use of cylinders for the storage of gas under high pressure, has received the following reply: "I am directed by the Secretary of State to say there are not at present any official regulations relating to cylinders of compressed gas. Railway companies, however, refuse to carry such cylinders unless the recommendations made by a Departmental Committee in 1896, as well as the conditions specified in the General Railway Classification of Goods by Merchandize Trains, are complied with. Up to the present this has been sufficient to ensure the requisite degree of safety; but the Secretary of State understands that the appointment of a Committee to report on the whole question of the use of coal gas as a substitute for petrol in motor vehicles is under consideration."

The Scarborough Gas Company have installed a filling-station for gas-driven motor vehicles at their meter-shop in Brunswick Terrace. Supplies can be had during ordinary business hours; and the charge is 6d. per 100 c.ft., with a minimum of 3d. for 50 c.ft.

The Huddersfield Corporation Gas Department have established a station at the Leeds Road works for the supply of gas to motor vehicles. The charge is 4d. per 100 c.ft.; and any amount of less than 50 c.ft. is to be charged as 50 c.ft. The daily hours are from 7 a.m. to 5.15 p.m., except Saturdays, when the closing time is 11.45 a.m. There is a charge of 6d. extra per motor for filling at any other times, and on public holidays.

The Corporation of Dumfries have arranged to supply gas for motor cars at the price of 3s. 7d. per 1000 c.ft.

Increases in Wages.—The Committee on Production award of a further 2s. advance in wages to Brighouse Corporation employees, except gas stokers, brings their total wages to 12s. per week above pre-war rates. The gas stokers have been dealt with separately, receiving an advance of 1s. per shift, representing 7s. 6d. per week (including Sundays), and bringing their wage to 17s. 6d. over pre-war rates. The Keighley Corporation have awarded all full-time male employees over 21 years of age—except in the tramways department, and certain higher paid officials—wages increases bringing their remuneration to 15s. above pre-war rates.



RELIABLE GAS-HEATED

Hot-Water Supply

AN INSTALLATION OF

"ACMEFONTS"

comprising six 40-gallon Boilers in Battery form supplying Hot Water to the Baths and Lavatories of the

GOVERNMENT CLEARING HOSTEL, HEREFORD.

"ACMEFONTS" can be used singly or in groups as shown. They are convenient, clean, simple in operation, and gas consumption is economical.

For Hard-Water Districts, troubles of lime deposits on internal metal parts of boilers are minimised by our special "NON-CRUST" treatment, which is applied without extra charge.

Please write us for full particulars,

ARDEN HILL & CO.

"Acme Works," BIRMINGHAM.

LIGHT AND ELECTRICITY FROM WASTE GAS.

The production of lighting gas from the coking process and the generation of electric energy from the surplus of the blast-furnace and coke-oven gases has, says "Engineering," increased very materially at the Rheinish-Westphalian mines of late years. In the year 1903 the first move in this direction was made by two mines in the Dortmund district—the König Ludwig and the Prosper I. mines, where lighting gas was produced at the coke-ovens. In addition, there were two other mining gas-works, those of Shamrock III. and Welhelmina Victoria. The aggregate gas production from these four concerns in 1903 amounted to only 44,500,800 c.ft. In the year 1906 the Deutscher Kaiser concern took up gas manufacture, and is now at the head of the list in this connection; and during the next few years a number of other mines followed the example. In the year 1908 the Sälzer-Neuoek mine alone produced over 176,000,000 c.ft. of gas. In the year 1914 the aggregate production of lighting gas from the furnaces in the Ruhr district amounted to more than 5600 million c.ft., against 4200 millions in 1912 and 1560 millions in 1910. In the year 1914, 23 mines had gone in for gas manufacture.

This rapid increase in the production of lighting gas from the furnaces is in the first place attributable to the construction of long-distance pipe lines, whereby many towns, some outside the industrial district proper, found it advantageous to discontinue the production of gas and draw their supplies, instead, from the furnace gas.

In this connection the Deutscher Kaiser concern is particularly to the fore; in the year 1914 producing no less than 1400 million c.ft. of gas, from which most of the towns in the mining district were supplied.

Coke-oven gas is also on an increasing scale used for the production of electric energy, either through the medium of gas-engines or as fuel under boilers. The production of electric energy at the mines and iron-works of the Ruhr district has risen from 566,000,000 KW.H. in the year 1909 to 1,689,000,000 KW.H. in 1914. Also in this connection the Deutscher Kaiser concern heads the list with a production of 210,000,000 KW.H., next comes the large Phönix Company with 200,000,000 KW.H. These two concerns only produce a small portion of the electric energy at the mines themselves; by far the greater part is generated at the iron-works or other places. The reverse is the case with most of the other mining concerns. Thus the Gelsenkirchen Company, in the year 1914, only produced 33,000,000 KW.H. at their iron-works and other works; while 131,500,000 KW.H. were generated at the mines. The disposal of electric current to outsiders in the year 1914 amounted to an aggregate of 66,000,000 KW.H.; but this figure falls short of the amount of electric energy which the mining companies obtain from other electricity works.

PATENT LAW REFORM.

In a paper read before the London Section of the Society of Chemical Industry on the 5th inst., Dr. F. W. Hay, of British Dyes Ltd., outlined a number of ways in which he suggested the patent law of the country could be improved, in order to give a greater measure of security to inventors.

The present system of search for a period of fifty years on the part of the Patent Office, in order to ascertain whether there has been anticipation, he regarded as insufficient, as it only applied to prior British patents. Unless the scope of examination was considerably enlarged, the result would always be unsatisfactory. Coupled with this extended search there should be the right of appeal to an Appeal Board, comprising the Controller or his delegate and three experts engaged in the industry to which the invention related; and, finally, there should be an appeal to the High Courts if an applicant did not think his case had been fairly dealt with. A further supplementary control was necessary in regard to patents relating to the chemical industry. Engineering patents could be verified by the drawings, but not so with chemical manufacture. It would be advisable to provide a suitable laboratory for the testing of chemical inventions, when the examiner was in doubt as to the veracity of the statements made. The examiner-in-chief should be entitled to revise the application in the light of the result of the test, subject to an appeal to the Appeal Board. He also proposed a period of five years after which a patent could not be attacked for want of novelty. A revision of Court procedure was also necessary. In the chemical industry the situation was particularly bad. Judges often had to form a judgment upon chemical matters of which they had but a rudimentary knowledge, and were compelled to depend upon the testimony of expert witnesses. Dr. Hay suggested a jury of technical men, in the same way that a special or common jury is now employed in ordinary legal actions.

Mr. Walter F. Reid said many an invention had had to lie dormant for years because technical men did not believe in it, and yet the patent had had a great application eventually. It would pay the public if patent fees were provided out of the public purse, as every invention was a source of wealth to the nation.

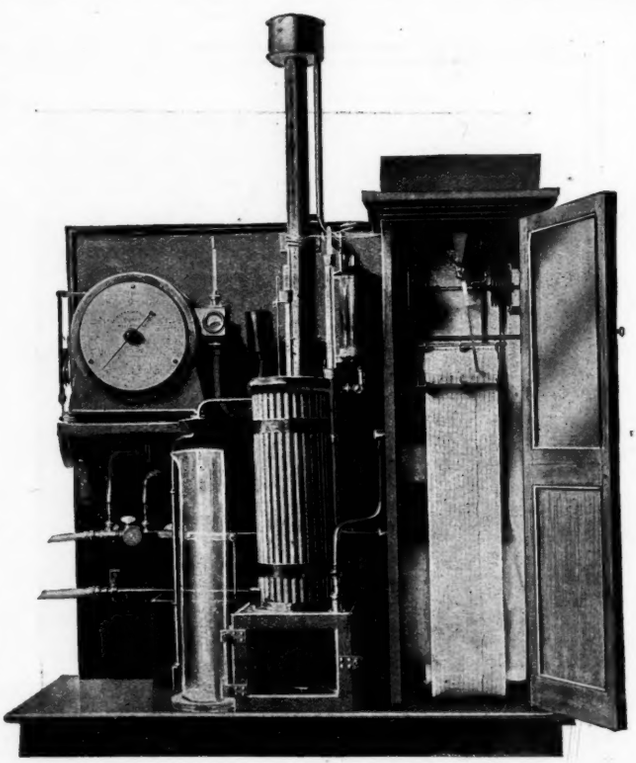
Mr. J. W. Gordon, K.C., said that, though there were difficulties in the way of Dr. Hay's suggestion for a technical jury, he thought they could be overcome. What he would like to see was a unified Imperial British patent system; and this might be kept in view by the Society, before they committed themselves to any definite scheme of reform.

Mr. Jacques Abady said that, in proportion as a patent was simple, so was it likely to be less the subject of infringement. The extended search he did not think would be an improvement, because it was not always prior specifications that were cited as anticipations; and it was

SIMMANCE'S
Total Heat Recording Calorimeter

¶ The only Recording Calorimeter which combines a Standard Calorimeter and a Recording device.

¶ Simmance's Total Heat Calorimeter is the only Total Heat instrument on the market, and has been adopted for Official Use in England, Canada, Queensland, &c.



ALEXANDER WRIGHT & CO., LTD.,
1, Westminster Palace Gardens, Artillery Row, Victoria Street, Westminster, S.W. 1.

for the inventor to look after himself more in this respect, because there were at his disposal ample facilities for search.

Mr. P. C. H. WEST feared to contemplate the results of setting-up a Government laboratory to test chemical inventions. This was a suggestion that must go to the wall. Neither did he favour the jury system—being quite satisfied with the present plan, under which, on the whole, judges decided fairly.

Mr. PEARSON suggested the formation of committees by the various industries interested in patent law reform, who should decide the extent of the modification of the law which was desired. When these committees had completed their work, a larger committee might be formed of representatives of the various industries, who would draw up a complete scheme of amendment to be submitted to Parliament.

Dr. HAY said it was clear there was room for a Sub-Committee to examine the situation.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Nov.* 26.

There is no change to record in the London tar products market since last week. Of those products which are not subject to official control, solvent naphtha is in a very strong position. The demand is insistent and well maintained; while supplies, both for spot and forward delivery, are increasingly scarce. Makers are not accepting anything below 4s. 3d. net per gallon naked *ex* works; and it is reported that even higher prices have been obtained. Pitch continues in good demand, though business for the export of this article is liable to be affected by the situation of the freight market. Some makers certainly would not take anything less than 48s. net per ton in bulk *ex* works.

The prohibition of export of sulphate of ammonia still continues in force, and all available supplies are being readily absorbed for home agricultural purposes under the Government scheme.

Tar Products in the Provinces.

Nov. 26.

Concerning the markets for tar products, there is nothing fresh to report.

The average values for gas-works products during the week were: Gas-works coal tar, 26s. 6d. to 30s. 6d. Pitch, East Coast, 20s. to 25s. per ton; West Coast—Manchester 18s. 6d. to 19s. 6d., Liverpool 19s. 6d. to 20s. 6d., Clyde 19s. 6d. to 20s. 6d. nominal. Benzol 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 3s. 3d. to 3s. 4d. Heavy naphtha, North, 1s. 8d. to 1s. 10d. Creosote, in bulk, North 3¾d. to 4¼d. Heavy oils, in bulk, North 4¼d. to 4½d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s. to 90s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Apart from solvent and heavy naphthas, there is very little alteration in the market position of tar products during the past week. London pitch remains at 48s. per ton f.o.b., and rather more is offered for early delivery. The Provincial position is slowly improving; the great drawback being the scarcity of tonnage. Home consumption values remain firm in spite of the greater accumulations which take place at this period of the year. Recent sales in the Manchester district have been made at 20s. per ton; but prices here are lower than anywhere else. Sellers generally are not particularly anxious to make sales at this level, as they are hoping for early improvement to accrue from the new order permitting the mixing of pitch with fuel oil, as soon as the practical difficulties of blending, which have arisen, are satisfactorily overcome. Solvent naphtha remains a very strong market; supplies being limited, especially for prompt delivery. Heavy naphtha is also dearer, and now makes up to 3s. per gallon. Creosote and carbolic acid are not much spoken of; but cresylic acid is hardening. Naphthalenes are quietly firm at late rates. Benzol and toluol are nominal. In America, benzol is fairly plentiful; but toluol is in great demand on Government and Allied account, and the only means of increasing supplies is through the gas companies, who are now permitted to manufacture gas under the B.Th.U. standard, instead of the candle power basis. To bring up the candle power it has hitherto been necessary to retain the light oil contents in gas, and even to enrich the gas occasionally with benzol. This had virtually no effect so far as the heat unit content of the gas was concerned, and as the modern incandescent system is really a heating process, the retention of the light oils in the gas has been a waste. The range of quotations is as follows:

Aniline Oil (pure): 1s. 2d. per lb.

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 4d. to 1s. 5d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 6d. per gallon; crystals 40% 1s. 3d. per lb.

Crude Tar: London 28s. to 32s., Midlands 25s. to 26s.; North 26s. per ton, *ex* works.

Pitch: London 48s. f.o.b.; East Coast, 22s. to 25s. f.o.b.; West Coast—Liverpool 21s. 6d. to 22s. 6d.; Manchester 22s. to 23s. f.a.s., Clyde 22s. 6d. per ton.

Solvent Naphtha: Naked London 90-190% 3s.; North 2s. 6d. to 2s. 9d. per gallon; 90-160% naked London 4s. to 4s. 6d.; North 3s. 9d. to 4s. per gallon.

Crude Naphtha: Naked 30% 8½d. to 8¾d.; North 6½d. to 6¾d.

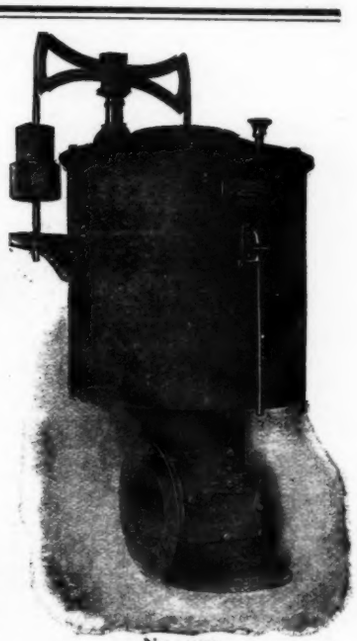
BRADDOCK'S RETORT-HOUSE GOVERNORS

HAVE PROVED TO BE

SECOND TO NONE.

Many repeat orders have been received.

Braddock's New Patent Retort-House Governor is a further improvement and is especially desirable for use with Vertical Retorts.



No. 310.
Braddock's New Patent Enclosed Retort-House Governor. Latest Type.

Further Particulars upon Application.

J. & J. BRADDOCK (BRANCH OF METERS LIMITED), **Globe Meter Works, OLDHAM.**

Telegrams: "BRADDOCK, OLDHAM." National Telephone No. 815.

AND 45 & 47, WESTMINSTER BRIDGE ROAD, LONDON, S.E. 1.

Telegrams: "METRIQUE, LAMB LONDON." Telephone No. 2412 HOP.

Naphthalene: Refined £32 10s. to £35; salts 8os., bags included.
Toluol: Naked, London 2s. 4d.; North 2s. 3d.
Creosote: Nominal, London 4½d.; North 3¾d.; heavy oil, 4½d. per gallon in bulk.
Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2½d.
Cresylic Acid: 95%, 2s. 7d.; 97-99%, 2s. 8d. to 2s. 9d. *ex* works London and f.o.b. other ports.
Grease Oils 18° Tw. (naked) £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

Export business is now practically suspended, and as far as can be seen at present there does not seem to be any likelihood of any export supplies being available until next April, and only then after our home requirements for agricultural and munition purposes have been properly met. Home sales still remain under the control of the Food Production Department, and a brisk trade is being done at the official limits. This trade is likely to increase greatly during the next month, as the price is advanced to £16 7s. 6d. per ton for deliveries from January to May of next year. There are slight grounds for hoping that some arrangement may be come to by which manufacturers may receive a better price for sulphate used for agricultural purposes after May next. Pressure is being brought to bear upon the authorities from several quarters; and it is just possible that something may be done, although not necessarily in the way of an increased price to the farmer. Certainly it would seem only fair for the Government to recognize the great service being rendered to the State by the gas and other concerns producing sulphate, especially in view of the inability of recouping themselves from further export sales at higher rates, and the practical impossibility in many cases of making a profit on home sales at the present official scale.

Increased Prices at Mansfield.—Larger expenditure has rendered inevitable an increase in the price charged for gas by the Mansfield Corporation, which from Jan. 1 is to be raised 9d. per 1000 c.ft. to all consumers. There has been a good deal of criticism forthcoming as to the proposed extra charge, which is regarded in some quarters as being unnecessarily high. But it is pointed out that, after the recent arbitration award in regard to augmented wages, and the heavier price of coal, the Corporation have no alternative in the matter. Mansfield is the centre of a rapidly developing coalfield; but here, as elsewhere, the increase of 2s. 6d. per ton decreed by the Coal Controller is having its unavoidable effect.

STOCK MARKET REPORT.

AFTER an opening dulled by the same lack of animation which has chilled it recently, the Stock Exchange had its pulse quickened last Wednesday. This welcome fillip, of course, was administered by General Byng's brilliant achievement on the Western front, which began on Tuesday. And the beneficent influence of this was materially corroborated by the gallant stand of the Italian forces in Venetia. At the same time, from some cause or other, the securities of unhappy Russia, now plunged in anarchy, had an occasional pause in their downward course and really looked like making a moderate counter movement. Thus aided, markets in general exhibited strength.

The gilt-edged division was firm, and War Loans and other Home Government issues showed steadiness. Colonials were rather prejudiced by the New South Wales Loan. Home Rails were better—prior charges especially being inquired for. Americans and Canadians were not so well supported, and Argentines, after falling at news of a fresh strike, recovered on reports of its settlement.

In the Foreign Market, French had a moderate advance; the immediate future being regarded as promising in the strong hands of the new Premier. Apart from Russians above mentioned, there was not much movement in the rest. There was greater activity among the Miscellaneous group. Iron and Steel and warlike industries were in great demand. Oils were popularized by the good working of our Persian wells, and Shipping and Breweries were all in renewed favour; but Rubber was under a cloud

Business in the Gas Market took a quieter turn last week, which was not welcome, as the week before had been an average show. There were fewer dealings and fewer undertakings dealt in. However, the tone was satisfactory enough; for pretty well every issue in which there was a transaction commanded a higher price. Many quotations advanced—viz., Bombay ⅛, Gas Light ordinary 1, Imperial Continental 1, Liverpool ¼, Monte Video ¼, South African ½, and South Metropolitan 1. *Per contra*, Primitiva was ⅛ lower.

In the Money Market, after a sharp demand in mid-week, rates became easier.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 70⅞, 71, 71⅛, ditto maximum 57, 57⅛, 57⅛, ditto preference 71⅛, Imperial Continental 89⅛, 90, 90⅛, Primitiva 35s., 36s. 6d., South Suburban preference 76, ditto debenture 86⅛, Tottenham preference 69⅛, 70. On Tuesday, Bombay 5 13/16, Croydon "C" 160, Gas Light ordinary 71, 71¼, 71⅛, ditto preference 71⅛, Imperial Continental 89⅛, 90, South Metropolitan 75⅛, ditto preference 95⅛. On Wednesday, British 32⅛, Croydon "B" 161, Gas Light ordinary 71⅛, 71⅜, ditto debenture 56, Primitiva 33s. 9d., ditto preference 57s. 6d., South Suburban 75⅛, ditto preference 75⅛, ditto debenture 86. On Thursday, Alliance and Dublin 54⅛, Commercial 3⅛ p.ct. 65⅛, Croydon "C" 161, Gas Light ordinary 71¼, 71⅛, 72, ditto preference 70⅛, 71, 71⅛, Imperial Continental 90⅛, 91, Liverpool 83¼, South Metropolitan 75, ditto debenture 55⅛. On Friday, Continental Union 41, Gas Light ordinary 71¼, 71⅛, 71⅜, 72, ditto maximum 57⅛, ditto preference 71⅛, South Suburban preference 76¼, ditto debenture 86⅜.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Ante-War Dividend & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref. .	..	57—62	..
1,551,868	,,	April 8	2½	4⅜%	Alliance & Dublin Ord.	59—64	52—57	54½
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	3/6	Bombay, Ltd.	5⅝—6⅜	5—5½	5 5/16
50,000	10	Feb. 26	16	14%	Bourne- 10 p.c. .	29—30	23—25	..
888,110	10	,,	7	7%	mouth Gas B 7 p.c. .	15—15½	10½—11	..
115,000	10	,,	6	6/-	and Water Pref. 6 p.c.	13½—14	9—9½	..
159,740	—	—	—	4%	4 p.c. Deb.	..	69—71	..
992,045	Stk.	Feb. 26	14	5 5/16%	Brentford A Consolid. .	201—206	79—82	..
734,920	,,	,,	11	4 1/16%	Do. B New . .	204—209	76—79	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref. .	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb. .	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig. .	208—213	145—150	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	98—103	..
530,000	20	Mar. 26	12½	22/6	British	44—45	32—33	32½
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk..	88—90	68—70	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	,,	—	—	CapeTown & Dis., Ltd.	1½—2½	3—3½	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref. . .	4—6	6½—7½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord. . .	108—110	79—81	..
1,513,280	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk. .	106—108	70—72	..
560.000	,,	,,	5½	40/-	Do. 8½ p.c. do. .	103—105	64—66	65½
475,000	,,	June 11	3	3%	Do. 8 p.c. Deb. Stk.	69⅛—71½	53—54	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	41
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c..	..	165—175	160—161
—	—	—	—	10%	Do. E	..	..	..
493,270	Stk.	—	6	5½%	Derby Con. Stk. . . .	128—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk. .	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd. . . .	17½—18	10½—11½	..
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas 4 p.c. Ord. . .	98—102	71—73	70⅝—72
2,600,000	,,	,,	3½	3½%	Light 3½ p.c. max. .	76—79	56—58	57—57½
4,082,235	,,	,,	4	4%	and 4 p.c. Con. Pref.	96—99	70—72	70½—71½
4,674.850	,,	June 11	3	3%	Coke 3 p.c. Con. Deb.	72½—74½	55—57	56
130,000	,,	,,	10	10%	10 p.c. Bonds . .	..	..	..
258,740	,,	Mar. 12	5	3½%	Hastings & St. L. 3½ p.c.	87—89	48—53	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅝	7½—8½	..
86,600	—	—	—	9%	Hornsey 7 p.c. . . .	..	115—125	..
131,000	Stk.	Mar. 12	7⅛	7%	Ilford A and C. . . .	151—154	92—97	..
65,780	,,	,,	6⅜	5⅝%	Do. B	115—118	72—77	..
65.500	,,	June 26	4	4%	Do. 4 p.c. Deb. . . .	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental .	150—160	90—93	89½—91
1,335,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	65—67	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c. .	119—121	82—87	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A B	211—213 146—148	82⅜—83½	83½
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—73	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	3⅜—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd. . .	11⅛—12	8½—8⅝	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98⅝—99½	76—76	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7/0	North Middlesex 7 p.c. .	14—15	9½—10½	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	10½—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7⅛—7⅜	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B . . .	128—131	83—88	..
100,000	50	,,	12	11%	Do. C . . .	118—121	73—78	..
52,000	50	,,	10	9%	Do. D . . .	..	..	..
249,980	5	April 29	8	—	Primitiva Ord. . . .	5½—6	1⅝—1⅞	33/9—36/6
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref. .	4⅜—5	2⅝—3⅛	57/6
521,600	100	June 2	4	4%	Do. 4 p.c. Deb. .	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb. .	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo 6 p.c. Pref..	10½—11	7⅛—8	..
125,000	50	July 1	5	5%	5 p.c. Deb. .	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	..	..
209,984	,,	,,	10	10%	Do. B	222—224	180—184	..
523.500	,,	,,	10	10%	Do. C	220—222	..	..
90,000	10	May 28	9	6/-	South African.	10½—11½	9—10	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord. .	111—113	75—77	75—75½
—	—	—	—	—	Do. Pref. . . .	..	94—96	95½
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb. .	72½—74½	55—57	55½
224,320	,,	Feb. 26	8½	7½%	South Shields Con. Stk.	157—159	137—139	..
962,795	,,	,,	6	4⅜%	S'th Suburb'n Ord. 5 p.c.	114—116	75—77	75½
60,000	,,	,,	5	5%	Do. 5 p.c. Pref. . .	110—112	75—77	75½—76½
135,000	—	—	—	4⅝%	Do. West Kent . .	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	86—86½
647,740	,,	May 14	5	5%	Southampton Ord. . .	99—102	75—77*	..
120,000	,,	Feb. 12	7½	5½%	Tottenham A 5 p.c. .	135—138	92—97	..
782,275	,,	,,	6	4%	District B 3½ p.c. .	115—117	70—72	..
181,255	,,	June 26	4	4%	4 p.c. Deb.	87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8⅜	7 2/6	Wandsworth A 5 p.c..	151—156	112—117	..
255.636	,,	,,	6¼	5 7/6	Do. B 3½ p.c. .	129—134	97—99	..
108,075	,,	,,	5/17/8	5 0/9	Do. C 3½ p.c. .	110—115	84—89	..
352,000	,,	,,	6⅜	5 1/3	Wimbledon 5 p.c. . .	117—122	85—90	..
98,000	,,	,,	6⅜	5 7/6	Epsom 5 p.c. . . .	121—126	93—98	..
88 416	..	June 26	3	3%	3 p.c. Deb. Stk. . .	66—69	50—53	..

* Ex Div.

Gas Workers on Strike.—A number of the men employed at the Lurgan Gas-Works, whose wages range from 18s. to 37s. 6d. per week, have gone on strike on the Council's refusal of their demand for an all-round increase of 6s. per week.

Rise in Price at Batley.—The Batley Gas Department have announced that, as from Jan. 1 next, gas charges will be advanced 6d. per 1000 c.ft. for lighting, and 8d. for motive power; discounts for prompt payment being continued. The extra charge of 1d. in the shilling in respect of slot-meter supplies is to be increased to 3d.

Price of Gas at Belfast.—The Belfast Corporation gas undertaking, which has hitherto contributed large profits in relief of rates, are confronted with the prospect of a deficit of £18,000, due to the high cost of coal and the increases in wages. The Gas Committee have, in the circumstances, decided to increase the price to consumers from 2s. 11d. to 3s. 6d. per 1000 c.ft.

Cheap Gas at Forfar.—Rates for Forfar are on the cheapest level in Scotland; and the price is to remain unchanged, notwithstanding the rise in the cost of coal. The Manager has been experimenting with the manufacture of water gas by means of vertical retorts; and this, it is anticipated, will counterbalance the extra expenditure. For the six months from May to November, the increase in the gas made in comparison with last year has been 2,982,800 c.ft.

Wages at Loughborough.—Gas employees of the Loughborough Corporation are agitating for a further increase of wages. The application has been made through the National Union of Corporation Workers, and has been referred to the General Purposes Committee. Although the gas consumption is increasing, and rose in September by 16·8 p.ct. over the previous year, or an increase of 1,350,200 c.ft. in a month, it is felt the undertaking can ill-afford to stand the additional demands now being made by the workmen.

Advance in Price at Aspatria.—In consequence of the increase in the cost of coal and other materials, the price of gas at Aspatria is to be advanced 3d. per 1000 c.ft., and a charge of 9d. per quarter for rent is to be put on all meters.

Higher Prices at Ilkeston.—Acting upon the recommendation of the Gas Committee, the Ilkeston Corporation have determined to raise the price of gas 8d. per 1000 c.ft. But there appears to be a good deal of dissatisfaction locally at the decision to make the increase retrospective as from Oct. 1. The legality of the Council's action in this respect is questioned by some consumers.

Gas Prices in Scotland.—The price of gas is increased at Brechin 3d. per 1000 c.ft., making the rate now 5s. for lighting, and 4s. 5d. for cooking and power. At Lanark, the increase is 5d. per 1000 c.ft. to consumers using ordinary meters, making the rate 4s. 7d., and 4d. for slot meters, making it 4s. 11d. The increase at East Kilbride is 5d. per 1000 c.ft.

Gas Complaints at Hammersmith.—The Hammersmith Borough Council reports that, in reply to the communication addressed to the Board of Trade with reference to the low pressure of the gas supplied locally by the Brentford Gas Company, and also to the increase in the price of gas, the Board states that they see no reason to question the explanation offered by the Company. Having regard to all the circumstances, they cannot suggest any action which the Council may usefully take in the matter.

A scheme of amalgamation has been adopted by the Executive Councils of the Dock, Wharf, and Riverside Workers' Union and the National Union of General Workers (formerly the Gas-Workers' Union). At a conference last week, all outstanding points were settled.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ASSISTANT WORKS CHEMIST. Stretford Gas-Works.
CHEMIST. No. 6376.
MANAGER. Alder-hot Gas, &c., Company.
MANAGER (Coke Recovery Works). No. 6380.
WORKING MANAGER. Tinsley, Sheffield.
RETORT-HOUSE FOREMAN. No. 6378.
RETORT-HOUSE FOREMAN. Peterborough Gas-Works.
JUNIOR DRAUGHTSMAN. Hendon Gas-Works, Sunderland.
FITTER. Wishaw Gas-Works.

Plant, &c. (Second-Hand) Wanted.

WASHER-SCRUBBER. No. 6383.

Yellow Prussiate of Soda Wanted.

No. 6382.

TENDERS FOR

Pipes, &c.

LEICESTER GAS DEPARTMENT. Tenders by Dec. 8.

Retort Setting.

MORECAMBE GAS DEPARTMENT.

Tar.

SHOTLEY BRIDGE AND CONSETT GAS COMPANY. Tenders by Dec. 12.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 23s. 6d.; Half Year, 12s.; Quarter, 6s. 6d. Payable in Advance. If credit is taken, an extra charge of 4s. a year is made.

Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

"VOLCANIC" FIRE CEMENT.
Resists 4,500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

ALDER AND MACKAY, LTD.
(ESTABLISHED 1850.)
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.
EDINBURGH.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, London, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB LONDON."

BENZOL PLANTS FOR GAS-WORKS.
BAGLEY, MILLS, & Co., Ltd.,
92, Victoria Street, Westminster, S.W., invite inquiries from all gas-works making 75 million cubic feet and upwards per annum.
See illustrated Advertisement Feb. 20, p. III. of Centre.

HUTCHINSON BROTHERS, Ltd.,
FALCON WORKS, BARNSLEY,
MANUFACTURERS OF
GAS METERS (Ordinary and Prepayment),
"FALCON" INVERTED LAMPS and SQUARE LANTERNS for Street Lighting,
INVERTED BURNERS and CONVERSION SETS for Street Lamps.

OXIDE OF IRON.
SPENT OXIDE WANTED.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.
Phone: Avenue 6680.

JAMES MILNE & SON, LTD.
(ESTABLISHED 1750.)
SLOT AND ORDINARY DRY METERS.
EXTENSIVE RANGE OF USEFUL GAS WORKS' ACCESSORIES.
EDINBURGH, GLASGOW, and LEEDS.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, ROSE MOUNT IRONWORKS, ELLAND.

BRITISH GAS PURIFYING MATERIAL.

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BRITISH GAS PURIFYING MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)
18, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London." 'Phone: Palmer's Green 608.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1588 AVENUE (3 lines).

SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—
BALE AND HARDY,
89, VICTORIA STREET, WESTMINSTER, S.W. 1.

NEWBURN, ELLIS, AND PRYOR.
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70, Chancery Lane, London.
Telegrams: "Patent London." 'Phone: 248 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams—"SATURATORS BOLTON." Telephone 0848.

"FERROX." "FERROX." "FERROX."
A BRITISH Oxide Cheaper and Better than Bogore. 35 per cent. Water, 75 per cent. Ferric Hydrate. For Sale outright or on Loan.
OXIDE LIMITED, Brentford, MIDDLESEX.

SOUTH WALES TAR COMPANY,
MAESTGWYNNER, near CARDIFF.

TAR WANTED.—Best Prices paid either at fixed Rate or Profit-Sharing Basis.
ENQUIRIES SOLICITED.

FOR Gas-Works Plant of Every Description; also SULPHATE OF AMMONIA and SULPHUR RECOVERY PLANTS.
C. & W. WALKER, LIMITED,
DONNINGTON, NEWPORT, SALOP.

SPENCER'S Patent Inclined HURDLE GRIDS'

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, p. 437.

JOHN RILEY & SONS, Limited, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 60 years. Reference given to Gas Companies.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

WORKS Chemist—Junior Assistant wanted at once. Knowledge of Benzol Testing and Calorimetry desirable.
Apply, with full Particulars of Experience, Age, and Salary, to the MANAGER, Gas-Works, STRETFORD.

WORKING Manager Wanted for Three Million Works in South Wales.
Apply, by letter, stating Age and Wages required, to C. H. HOLLAND, Tinsley, SHEFFIELD.

WANTED—Retort-House Foreman. Must be a First-Class Carbonizer. Wages, £3 per Week.
Apply, with References, stating Age and Experience, to J. BARTON, Manager, Gas-Works, PETERBOROUGH.

WANTED, in the London district, a Second-Hand Rotary or Centrifugal WASHER SCRUBBER, to pass about 1 to 1½ Million c.ft. per diem.
Particulars, with Price, to No. 6383, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

JUNIOR Draughtsman Wanted as soon as possible, in connection with considerable Extensions of Works. Preference given to one with knowledge of Constructional Steel Work and Gas-Works Plant.
Apply, by letter, enclosing *Copies* of recent Testimonials, stating Age, Experience, and Salary required, to the ENGINEER, Hendon Gas-Works, SUNDERLAND.

WANTED—Chemist (Ineligible) for Suburban Gas-Works, able to Undertake Usual Works Tests.
Apply, by letter, stating Salary required, to No. 6376, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED, for the North of England, MANAGER for Coke Recovery Works.
Apply, by letter, giving Age, Qualifications, Salary expected, and enclosing *Copies* of Three Testimonials, to No. 6380, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

RETORT House Foreman required for 400 Million Works in South East Lancashire. Generator Furnaces, Stoking Machinery Electrically Driven. Good Wages for Reliable Man.
Apply, by letter, with References and full Particulars, to No. 6378, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED—for the Wishaw Corporation Gas-Works—a Competent FITTER, one with knowledge of electrically driven plant preferred. Average hours per week, 65. Wages, 60s. weekly. Permanent Job.
Apply, stating Age and Experience, to the MANAGER, Gas-Works, WISHAW.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY.
(NORTH CAMP GAS-WORKS.)
APPLICATIONS are invited for MANAGER of these Works. Good Organizer, &c. State Salary required (House provided), enclosing *Copies* of Three recent Testimonials, to W. FISH, Secretary, Chief Office, Victoria Road, ALDERSHOT.

YELLOW Prussiate of Soda wanted, for Delivery over 1918.
Offers, free on Rails Works, to No. 6382, care of Mr. KING, 11, Bolt Court FLEET STREET, E.C. 4.

GAS PLANT for Sale.—We can always offer New and Second-Hand Gas Apparatus, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, near LEEDS.

SHOTLEY BRIDGE AND CONSETT DISTRICT GAS COMPANY.
TENDERS FOR TAR.
THE Directors of this Company invite TENDERS for the Purchase of the TAR produced at their Works from the 1st of January to the 31st of December, 1918. Quantity, about 80,000 Gallons. Contractor to find his own Casks, and to accept Delivery at Blackhill Station.
Tenders to be sent to the undersigned not later than Wednesday, Dec. 12, 1917.
M. RICHLEY,
Secretary.
Offices, Front Street,
Shotley Bridge.

CORPORATION OF LEICESTER.
(GAS DEPARTMENT.)
CAST-IRON PIPES.
THE Gas Committee of the Corporation of Leicester are prepared to receive TENDERS for the Supply and Delivery of the necessary CAST-IRON PIPES and CONNECTIONS, from 2 in. to 36 in. in diameter, required during the Twelve Months ending Dec. 31, 1918.
Specification and Form of Tender can be obtained upon application to the Engineer.
Tenders, addressed to Mr. Councillor Hilton, Chairman, and endorsed "Tender for Pipes, &c.," to be Delivered at these Offices not later than eleven o'clock a.m. on Saturday, Dec. 8, 1917.
The Committee do not bind themselves to accept the lowest or any Tender.
HUBERT POOLEY, Assoc.M.Inst.C.E.,
Engineer and Manager.
Gas Offices: Millstone Lane, Leicester, Nov. 20, 1917.

MORECAMBE CORPORATION.
(GAS DEPARTMENT.)
TENDERS are invited for the Re-SETTING of RETORTS.
All particulars may be obtained from the undersigned.
R. HY. RUTHVEN,
Engineer and Manager.

TOTTENHAM DISTRICT LIGHT, HEAT AND POWER COMPANY.
NOTICE is Hereby Given, that the TRANSFER BOOKS of the Company, so far as they relate to DEBENTURE STOCK, WILL BE CLOSED from the 8th to the 15th of December, 1917, both days inclusive.
The Interest for the half year to 31st December, 1917, will be payable on the 1st of January, 1918, to the Proprietors registered on the closing of the Books.
By order of the Board,
E. J. K. FUSSELL,
Secretary.
Chief Offices of the Company,
699, High Road, Tottenham,
Nov. 22, 1917.

HORLEY DISTRICT GAS COMPANY.
NOTICE is hereby given that the TRANSFER BOOKS of the Company, so far as they relate to DEBENTURE STOCK and MORTGAGE DEBENTURES, WILL BE CLOSED at 10 o'clock in the forenoon on Saturday, the 1st day of December, 1917, and will be RE-OPENED on Wednesday, the 12th day of December, 1917.
The Interest Warrants for the Half Year will be posted on the 31st day of December, 1917, to the Proprietors registered at the closing of the books.
By order of the Board,
R. SEYMOUR TOREY,
Secretary.
Offices: Station Road, Horley, Surrey.
Nov. 21, 1917.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.
MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at THE MART, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. RICHARDS, at 37, WALBROOK, E.C.

TROTTER, HAINES, & CORBETT, LIMITED.
BRETTELL'S ESTATE,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.
LONDON OFFICE: E. C. BROWN & CO., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

KOPPERS' PATENT
CHAMBER OVENS.
Results obtained which have never been Surpassed by any other System of Carbonization.
Plants at Work and under Construction for the production of **70,000,000** cubic feet of Gas per Day.
See our large Advertisement appearing in alternate issues of the "JOURNAL."
The KOPPERS'
COKE OVEN AND BYE-PRODUCT CO.,
301, Glossop Road, SHEFFIELD.

BIRTLEY IRON COMPANY,
ESTABLISHED 1820,
Owners of the Birtley Iron Works and Pelaw Main Collieries,
GENERAL ENGINEERS & IRONFOUNDERS.
Makers of Cast-Iron PIPES and CONNECTIONS for Gas, Water, Steam, Electrical, Sanitary, and other purposes; also TANKS, COLUMNS of every description, Hydraulic, Gas, and Colliery PLANT, &c.
Illustrated Catalogue, giving complete list of our Manufactures, on Application.
Works: BIRTLEY, CO. DURHAM.
Newcastle-on-Tyne Offices, MILBURN HOUSE.